FILE NO.

SANYO

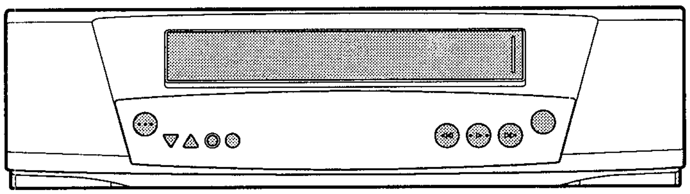
SERVICE MANUAL

Video Cassette Recorder

VHR-459EE
(Product Code : 143 179 26)
(East Europe)

VHR-459EV
(Product Code : 143 179 25)
(Europe)

VHR-489SP
(Product Code : 143 179 06)
(Spain)
(Portugal)
(Italy)



(VHR-459EE)

VHS PAL

CONTENTS

Please see other materials with Reference number given in table below.

Materials	Model No.	Reference No.
Mechanism Manual	VC Mechanism	MM531683

PRODUCT SAFETY NOTICE

The components designated by a symbol (⚠) in this schematic diagram designates components whose value are of special significance to product safety. Should any component designated by a symbol need to be replaced, use only the part designated in the parts List. Do not deviate from the resistance, wattage, and voltage ratings shown.

NOTE: 1. Parts order must contain model number, part number, and description.
2. Substitute parts may be supplied as the service parts.
3. N.S.P. : Not available as service parts.

Design and specifications are subject to change without notice.

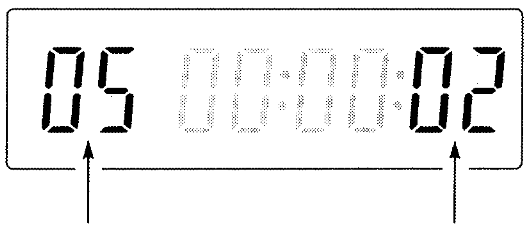
SELF-DIAGNOSIS DISPLAY

Mechanism Mode Display / Head Output Drop Warning Display

This unit displays the diagnosis contents of abnormalities and the mechanism mode on its display panel in 2-digit numbers.
When the head playback output has dropped, the "L" sign will be blinked.
These display shows the outline of the problems. Use it as a reference when servicing the unit.

1. Self-Diagnosis Contents and Mechanism Mode Display

- When the STOP button on the remote control is pressed for about 10 seconds continuously, the self-diagnosis number will be displayed on the reception channel display of the display panel and number indicating the failed mechanism mode (changed mode when being shifted) on the tape counter "seconds" display for 10 seconds each.
- During self-diagnosis display, displays other than the diagnosis number/mechanism mode number will be turned off and when displays end, the normal display will be returned automatically.
- Refer to "Self-Diagnosis Contents" for the self-diagnosis numbers and the "Mechanism Mode Display Contents" for the mechanism mode numbers.
- When the "0" button on the remote control unit is pressed during display, and clearing the self-diagnosis display and mechanism mode display.



Self-Diagnosis Contents

No.	Problem	Main Possible Cause	Mechanism Operations and State After Occurrence
00	There is no abnormality in the mechanism.		
01	The cylinder motor does not rotate.	• The cylinder motor is faulty. • The control of the cylinder motor is faulty. • The tape winds around the cylinder.	Shifts to the STANDBY mode, and the power goes off.
02	The take-up reel or supply reel does not rotate.	• The take-up reel or supply reel is caught. • The reel belt is faulty. • The reel torque has decreased.	Shifts to the STANDBY mode, and the power goes off.
03	The capstan motor does not rotate.	• The capstan motor is faulty. • The control of the capstan motor is faulty.	Shifts to the STANDBY mode, and the power goes off.
04	The tape cannot be loaded with the cassette inserted. (But unloading can be performed.)	• Error in the operations of the tape loading mechanism. • Foreign particles in the tape loading mechanism. • The tape end sensor is faulty. • The reel brake of the tape cassette has not been released.	Unloads, shifts to the INITIAL mode, and the power goes off.
05	Tape loading and unloading cannot be performed with the cassette inserted.	• The tape guide is caught. • The loading motor is faulty. • The control of the loading motor is faulty.	The power is forcibly turned off with the mechanism at its current position.

No.	Problem	Main Possible Cause	Mechanism Operations and State After Occurrence
06	Front unloading cannot be performed when ejecting the cassette. (Front loading can be performed.)	• The cassette drive mechanism is faulty. • The front door is caught.	Front loads and shifts to the STOP or INITIAL mode. • When the power switch is turned on before eject operations: Shifts to the STOP mode. • When the power switch is turned off before eject operations: Shifts to the INITIAL mode and the power goes off.
07	Front loading and front unloading cannot be performed when ejecting the cassette.	• The tape cassette is caught in the cassette drive mechanism. • The main cam and front rack gear of the front loading mechanism have not engaged properly. • The gears of the front loading drive mechanism have not engaged properly.	The power is forcibly turned off with the mechanism at its current position.
08	The mechanism becomes 1 (REVIEW) while moving from 2 (IDLER), 3 (STILL), 4 (BRAKE), and to 5 (STOP).	• The mechanism mode switch contact is faulty.	The power is forcibly turned off with the mechanism at its current position.
09	The mechanism becomes 7 (INITIAL) while moving from 1 (REVIEW), 2 (IDLER), 3 (STILL), 4 (BRAKE), and to 5 (STOP).	• The mechanism mode switch contact is faulty.	Carries out tape take-up operations, shifts to the STANDBY mode, and the power goes off.
10	The capstan motor does not rotate and cassette tape eject when cassette tape insert.	• The capstan motor is faulty. • The control of the capstan motor is faulty.	Shifts to the EJECT mode. Protect cassette tape.
11	The cylinder motor does not rotate and cassette tape eject when cassette tape insert.	• The cylinder motor is faulty. • The control of the cylinder motor is faulty.	Shifts to the EJECT mode. Protect cassette tape.
12	The supply reel does not rotate and cassette tape eject when tape unloading.	• The supply reel is caught. • The reel belt is faulty. • The reel torque has decreased.	Shifts to the EJECT mode. Protect cassette tape.

Note: For details of mechanism operations corresponding to the mechanism positions of the self-diagnosis numbers 08 and 09 above, refer to the separate volume on the VC mechanism manual. These manual reference numbers are shown in the cover.

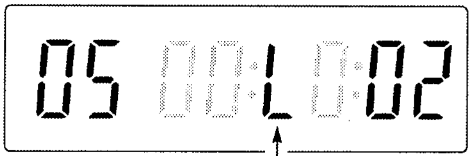
Mechanism Mode Display Contents

Mode No.	Mechanism Mode	Mode No.	Mechanism Mode	Mode No.	Mechanism Mode
00	CASSETTE OUT	07	SLOW	14	FAST FORWARD
01	STANDBY	08	PLAY	15	REWIND
02	STOP	09	REC	16	VIDEO INSERT
03	STILL	10	AUDIO DUBBING	17	VIDEO INSERT-PAUSE
04	REC-PAUSE	11	X2 SPEED PLAY	18	AUDIO/VIDEO INSERT
05	AUDIO DUBBING-PAUSE	12	CUE	19	REVERSE X2 SPEED PLAY
06	FRAME ADVANCE	13	REVIEW	99	OTHERS

2. Head Output Drop Warning Display

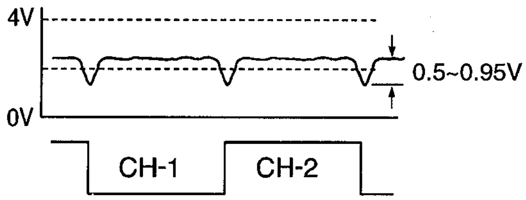
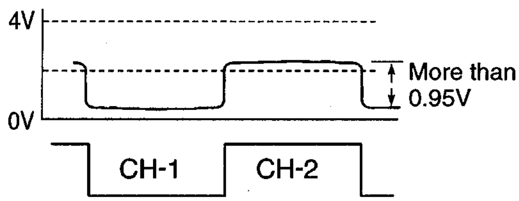
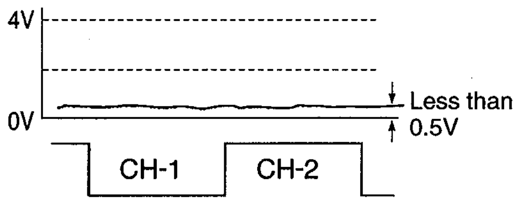
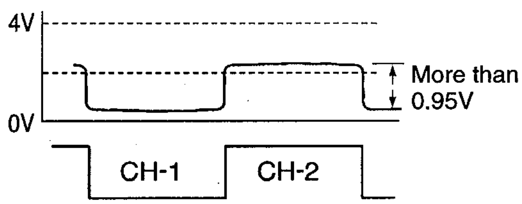
- When the STOP button on the remote control is pressed for 10 seconds continuously 10 seconds after play starts, "L" will be displayed blinking at the first digit of the minutes position on the tape counter when the head output is lower than the specified value to indicate an abnormality.
- The cause of the abnormality may be due to drop in the playback output caused by drop in the efficiency of the cassette used or head clogging. Refer to "Head Playback Output Voltage Check" as a means to judge the abnormality.

Display panel



Head output drop warning display (Tape counter "1st digit of Minutes." position)

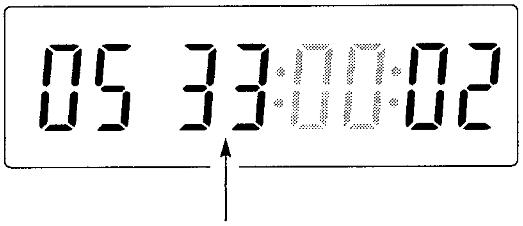
Head playback output voltage check

Cassette Used	Warning Display	Envelope Detection Output Voltage	Main Cause
Cassette with normal playback output	–	Envelope detection output (IC301 Pin 85 or C3016 HOT side: see Fig. 2-1-1) Switching pulse (TP183: see Fig. 2-1-1) 	When the output voltage difference of the two channels is 0.5 to 0.95V • The video heads of both are normal
Recorded cassette (with tabs)	"L" blinking	Envelope detection output (IC301 Pin 85 or C3016 HOT side: see Fig. 2-1-1) Switching pulse (TP183: see Fig. 2-1-1) 	When the output voltage difference of the two channels is more than 0.95V • Tracking adjustment has not been performed accurately • One video head is clogged • One video head has worn out
	"L" blinking	Envelope detection output (IC301 Pin 85 or C3016 HOT side: see Fig. 2-1-1) Switching pulse (TP183: see Fig. 2-1-1) 	When the average outputvoltage of the two channels is less than 0.5V • Tracking adjustment has not been performed accurately • Both video heads are clogged • Both video heads have worn out
Rental cassette (without tabs)	"L" blinking	Envelope detection output (IC301 Pin 85 or C3016 HOT side: see Fig. 2-1-1) Switching pulse (TP183: see Fig. 2-1-1) 	When the output voltage difference of the two channels is more than 0.95V • Tracking adjustment has not been performed accurately • One video head is clogged • One video head has worn out
	• Some rental cassettes may have extremely low video playback outputs even when both video heads are normal. As the average output voltage of the two heads may be less than 0.5V for some, no warning displays will be shown.		

3. Cylinder rotation accumulated time display

- Press the STOP button on the remote control for approximately 10 seconds and the cylinder rotation accumulated time excluding the cassette out and standby operation time will be displayed on the "Hours" display in units of 100 hours. ("33" will be displayed for 10 seconds for 3,200 to 3,299 hours.)
- To erase the cylinder rotation accumulated time display, press the RESET button on the remote control during the accumulated time display.

Display panel



Cylinder rotation accumulated display (Tape counter "Hours" display)

1. DISASSEMBLY

1-1. REMOVAL OF CABINET, MECHANISM UNIT, AND MAIN BOARD

REMOVING THE CABINET PARTS (Fig. 1-1-1)

1. Remove the cabinet by removing the four screws (1).
2. Remove the front panel by removing the locks of the clamps (A) using a screwdriver, etc. and slightly rotating the bottom part in the direction of the arrow.

Notes: • Electrical adjustments for the this model can be performed with only the cabinet removed.

REMOVING THE MECHANISM MAIN UNIT AND THE CP-1 PWB ASSEMBLY (Fig. 1-1-2 and 1-1-3)

After removing the cabinet parts, remove the mechanism unit and the CP-1 PWB assembly connected as follows.

1. Remove the five screws (2) as shown in Fig. 1-1-2.
2. Remove the two screws (3) at the CP-1 board, and then disconnect the bottom cover.
3. Remove the two screws (4) and two screws (5) of the mechanism unit. The two screws (5) of the cassette tray can be removed easily by pushing the lid opener lever in the arrow direction to remove the lock as shown in the enlarge view.
4. Lift up the whole mechanism unit and main board (CP-1 PWB assembly), and as shown in Fig. 1-1-3, so that they can be removed from the chassis.

M-SE2L/E2-1

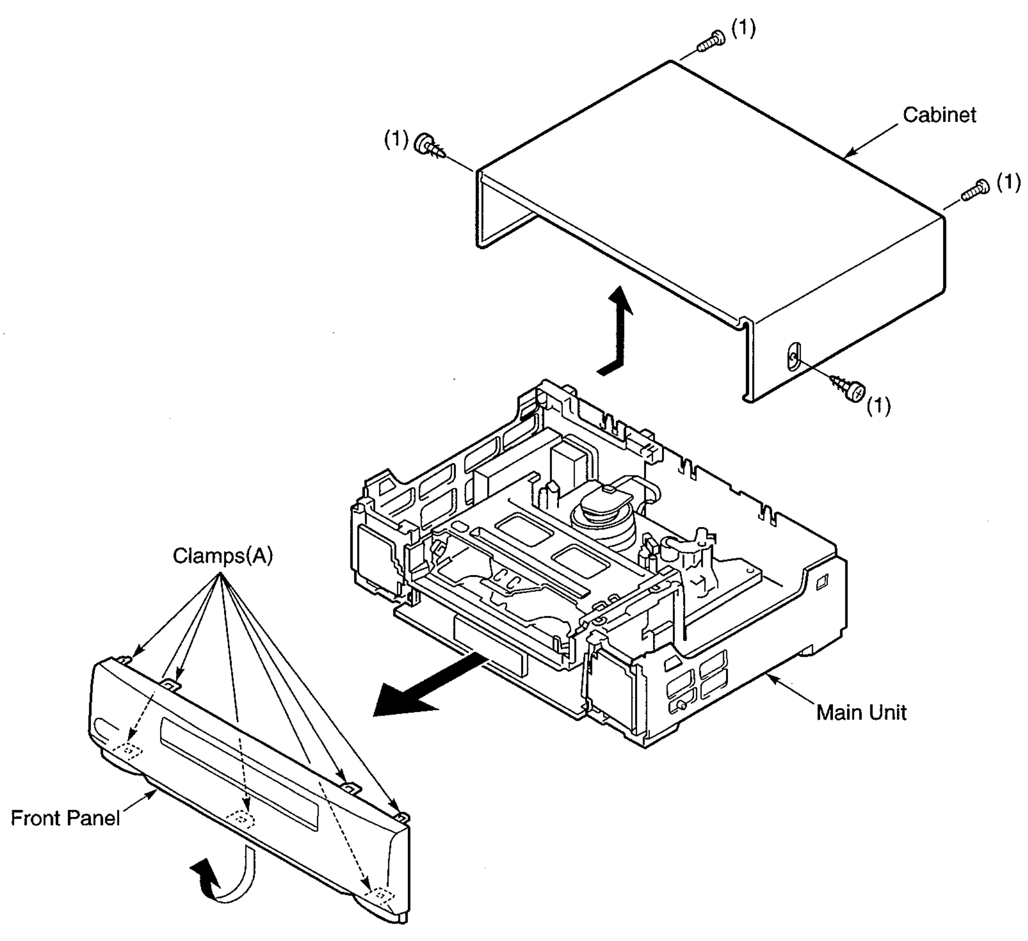


Fig. 1-1-1

M-SE2L/E2-2

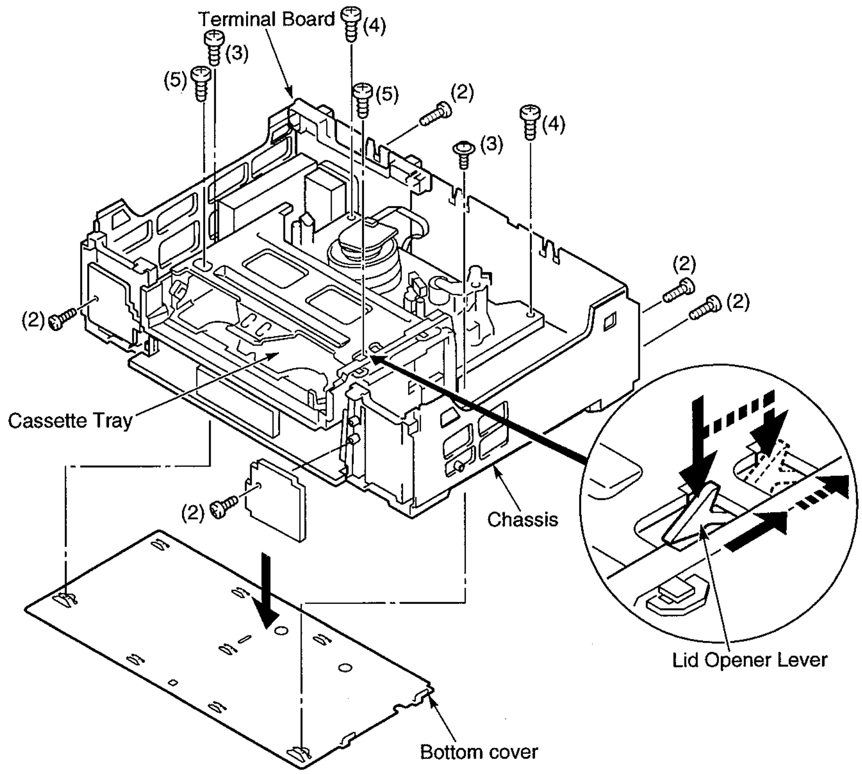


Fig. 1-1-2

M-SE2L/E2-3

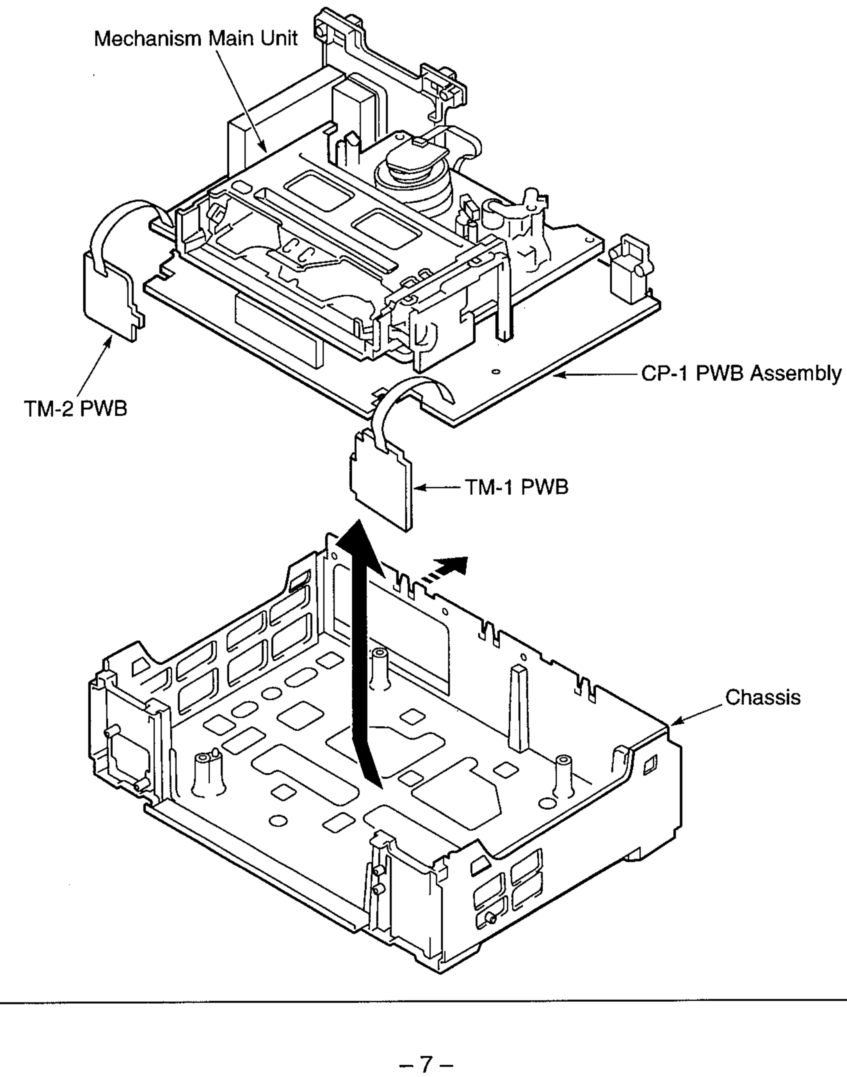


Fig. 1-1-3

1-2. TEMPORARILY SETTING UP AND CONNECTING CP-1 PWB ASSEMBLY

The following is an example of how to place and connect the main board without a jig, when repairing the CP-1 PWB assembly.

1. Place the mechanism unit and main board up side down as a whole on a flat surface with foil side of the main board facing up.
2. Operete the unit using the buttons on CP-1 PWB or the remote control.

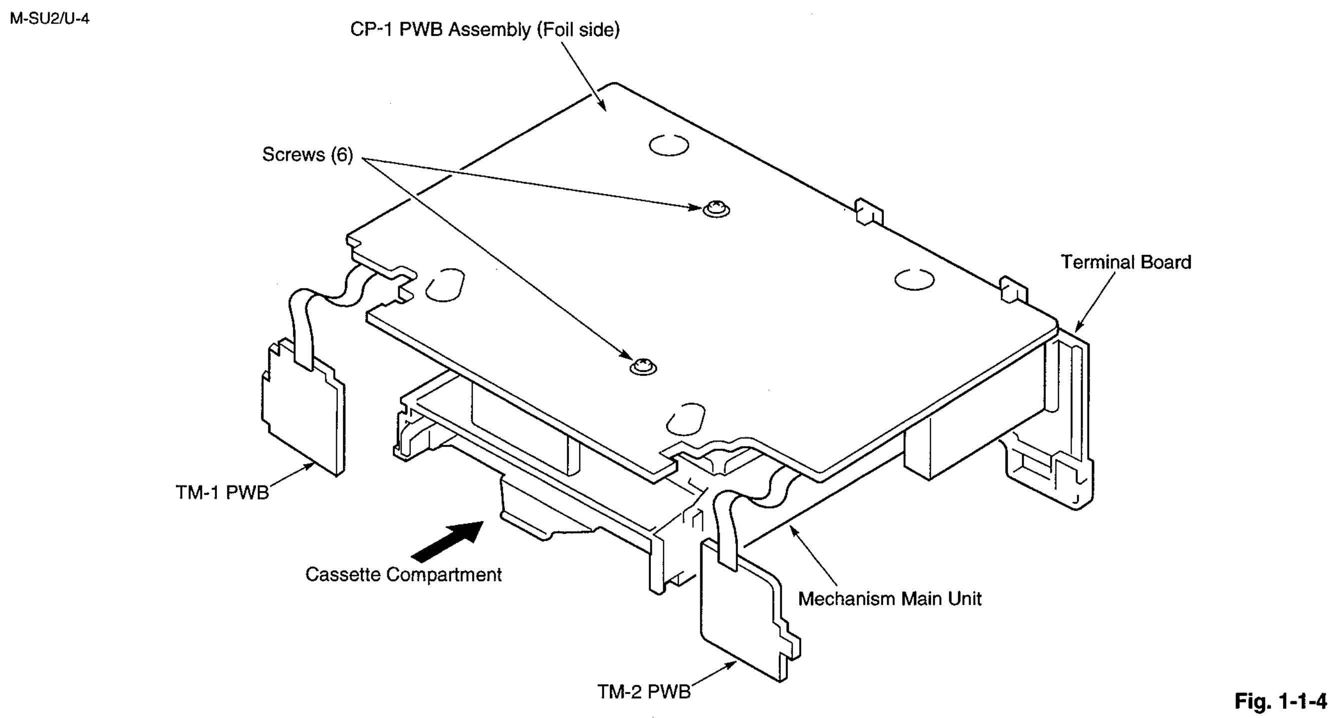


Fig. 1-1-4

1-3. INSTALLATION OF THE FRONT PANEL

When installing the front panel to the chassis after repaires and adjustments.

1. Pressing down the door opener lever of the mechanism main unit.
2. Set the cassette door to half-opened state as shown in Fig. 1-1-5, and install the front panel to the chassis.

Note: Opened cassette door position does not install the front panel to the chassis.

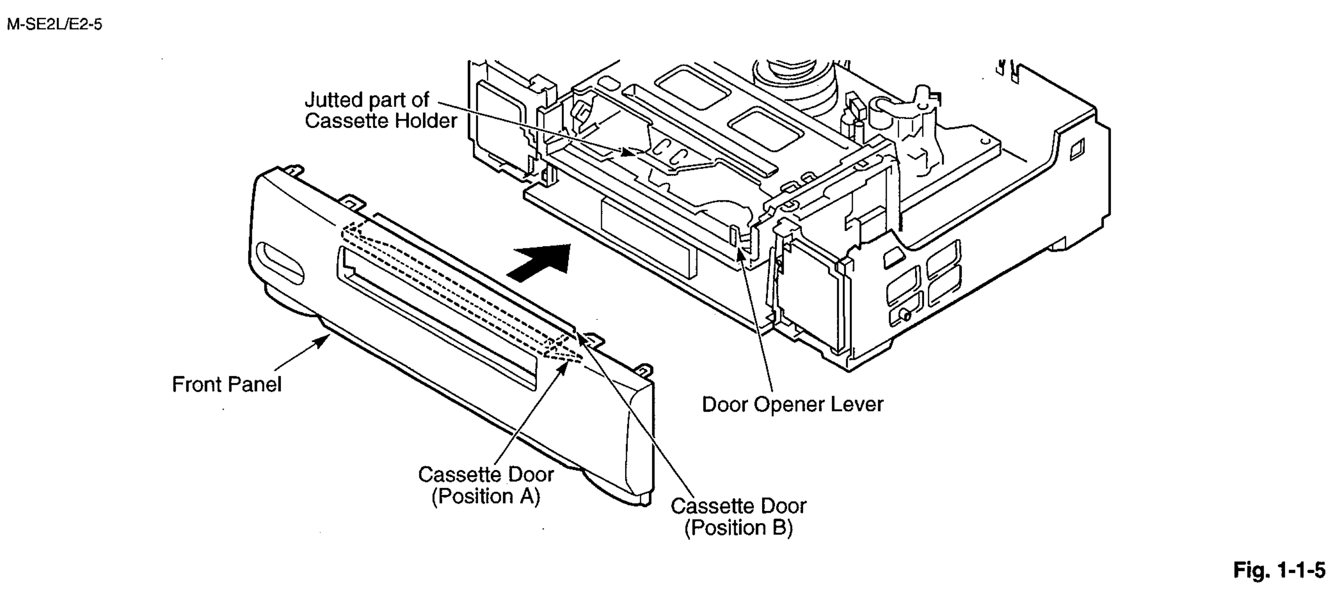


Fig. 1-1-5

Note: Before assembling the mechanism unit and the CP-1 board, check the eject mode positioning marks as shown in Fig. 1-1-6 and Fig. 1-1-7.

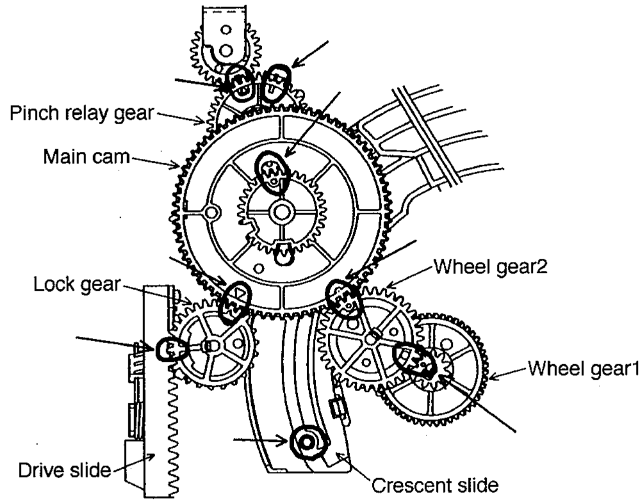


Fig. 1-1-6

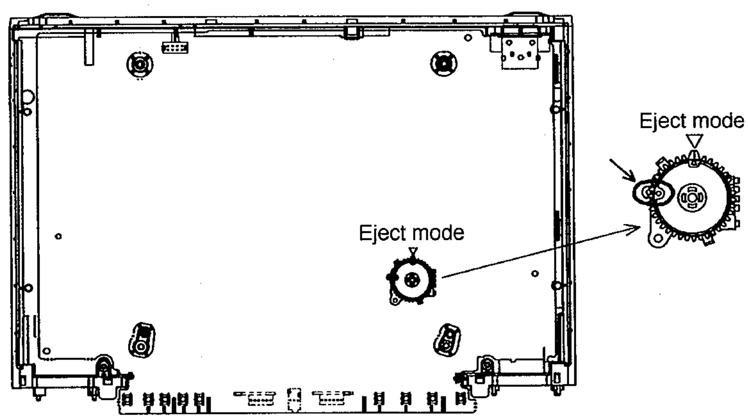
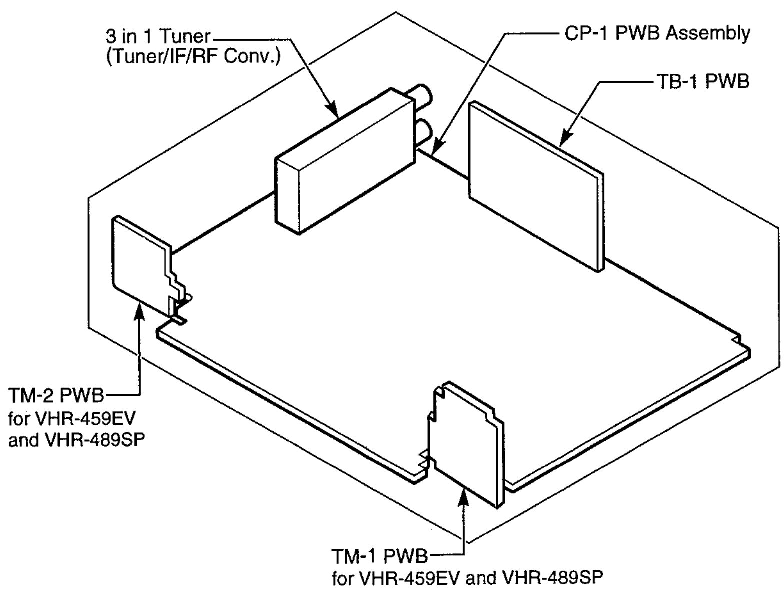


Fig. 1-1-7

1-4. CIRCUIT BOARD LOCATIONS

L-SE2L/E



2. ELECTRICAL ADJUSTMENT

VCR PRESETTING

This VCR need three basic presetting by using the menus displayed on-screen. After all connection have been made, then follow steps 1 to 3 to preset the VCR.
The three presetting steps will be displayed in sequence on TV screen. The setting are entered with the remote control.

Turn on the VCR
1. Adjusting the TV receiver to the video channel: The AUTO SETUP screen will appear. When the video channel has been preset, press the OK button on the remote control.
2. Country selection: Using the numeric button, select the country of use.
3. Language selection: When the desired language has been select, press the MENU/TV button directly before prevent auto tuning will start.

When steps 1 to 3 have been finish, ready to operate the all operating mode.

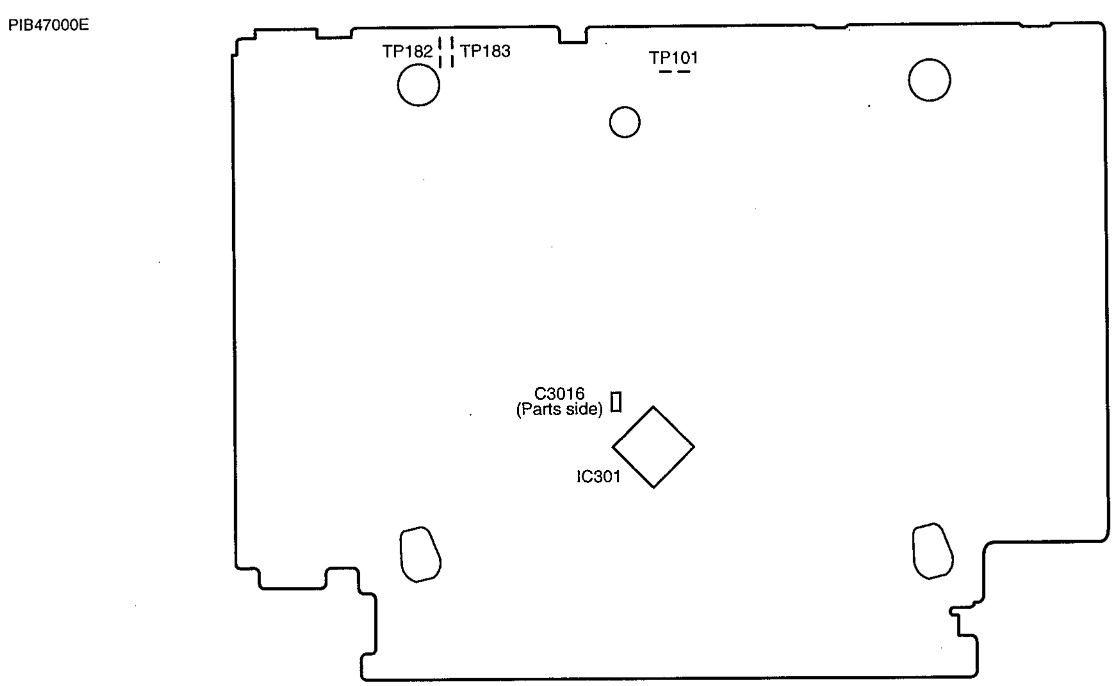
2-1. SERVO CIRCUIT ADJUSTMENT

- These adjustments should be done upon completion of the tape transport adjustments.
- If the tape transport adjustments (except the tilt adjustment) are done after these adjustments, follow the procedures again in section 2-1-3, "Switching position adj."
- When a cassette tape is loaded, auto-tracking will be set immediately after starting the first playback. As this will daviate the tracking center set, be sure to press the channel buttons▲(+) and ▼(–) once directly after starting playback to prevent auto-tracking from being set.

2-1-1. TEST EQUIPMENT AND STANDARDS REQUIRED

Oscilloscope	Vertical sensitivity Bandwidth	: 5 mV/DIV, external trigger : more than 10 MHz
Alignment Tape	VHJ-0009 or VHJ-0023	: SP mode, monoscope, 6 KHz
Blank Tape	VHS-type cassette tape	
Monitor TV		

2-1-2. LOCATION OF ADJUSTMENT POINTS



CP-1 PWB (Foil side)

Fig. 2-1-1

Note:

- Set the REC/PLAY SPEED button to indicator panel in the SP mode.
- Self-recording means "Record any broadcasting or video signal and playback the just-recorded portion."

2-1-3. SWITCHING POSITION ADJ.

Measuring Point	Measuring Equipment	Adj. Condition
TP101 (VIDEO OUT) TP183 (RF SW-P)	Oscilloscope	PLAY (SP) mode Alignment tape VHJ-0009 (PM-S6)

Adj. Location	Adj. Value
REC button CHANNEL ▲ (+)/▼(–) button PLAY button	6.5 H ± 0.5 H

1. At playback starts, press the REC button 3 times within 3 seconds after the playback picture comes out. However, these 3-push must be done within 2 seconds, and last push must be kept pressed for 0.5 seconds. (Fig. 2-1-3)
2. "P 0:00" is appeared in FLD, and it becomes the adjustment mode. This indication value changes automatically, and 6.5 H adjustment is done. When this value stops, adjustment value almost becomes 6.5 H.
3. Observe the video output signal by the oscilloscope, triggered by the fall down point of RF SW PULSE (TP183), and confirm that a front edge of V-SYNC is delayed for 6.5 H ± 0.5 H from the fall down point of RF SW PULSE. (Fig. 2-1-4)
4. After the adjustment data is fixed (it should be within 15 seconds from the adjustment mode start), press the PLAY button more than 1 second. Then the indication changes to "P – : – ", it writes the data (delay quantity) to the E²PROM. (If it passes through 15 seconds before pushing the PLAY button, the intake of the data isn't done, and it finishes the adjustment mode.)
5. If it is not in 6.5 H ± 0.5 at the time of the confirmation by the above 3., make manual fine adjustment by pressing the CHANNEL button, and do the operation of 4.

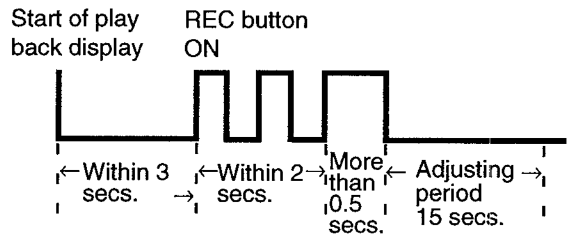


Fig. 2-1-3

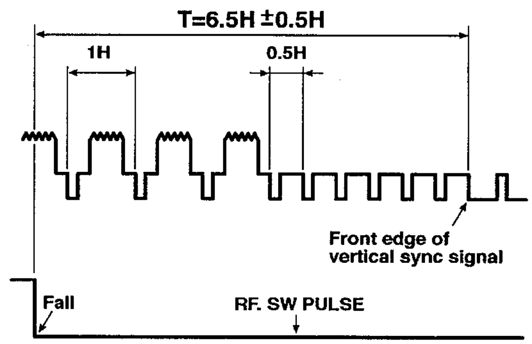


Fig. 2-1-4

2-1-4. SP STILL V-LOCK ADJ.

Measuring Point	Measuring Equipment	Adj. Condition
Picture of monitor	Monoscope pattern	Self-recording (SP mode) STILL mode

Adj. Location	Adj. Value
CHANNEL▲(+) or▼(–) button	The minimum vertical shake

1. Set the REC/PLAY SPEED button to the SP mode.
2. Play back the own recorded portion of the tape and then set the VCR in the STILL mode.
3. Press the CHANNEL▲(+) or▼(–) button so that the vertical shake of picture becomes its minimum.

2-2. IF CIRCUIT ADJUSTMENT

- In this model, the circuits of the TUNER, IF, and RF converter have been made into one. Therefore, should one circuit malfunction, the whole unit must be replaced.
- The adjustments for the IF (RF AGC) circuit of the 3 in 1 tuner are described below.

Note: The 3 in tuner dose not need any adjustments, because precise adjustments were down before shipment.

2-2-1. TEST EQUIPMENT AND STANDARD REQUIRED

Monitor TV	

2-2-2. LOCATION OF ADJUSTMENT POINT

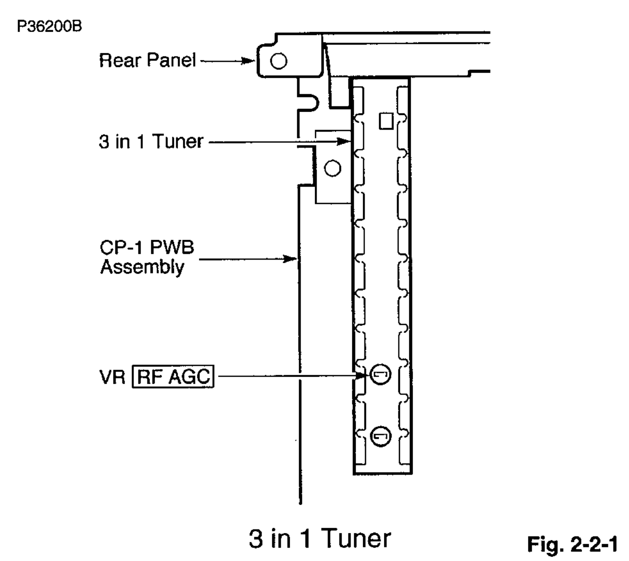


Fig. 2-2-1

2-2-3. RF AGC ADJ.

Measuring Point	Measuring Equipment	Adj. Condition
Picture of monitor TV	Monitor TV	E-E mode

Adj. Location	Adj. Value
VR (RF AGC) (on the 3 in 1 tuner)	S/N is best point

1. Connect the monitor TV to the VHF/UHF antenna output terminal.
2. Connect the VHF or UHF antenna to the VHF/UHF antenna input terminal.
3. Receive the middle electrical field (70 dBμ ~ 90 dBμ) of the VHF or UHF channel, and slowly turn the VR (RF AGC) from the point where snow-noise is present to the point where it just disappears from the monitor TV.
4. Confirm by monitor TV that there is no beat and saturation (S/N is best point) when receiving any TV channel.

2-3. CHECKING THE RF CHANNEL

If the TV and VCR are connected by an aerial output cable which has poor shielding characteristics, turn off the RF converter of the VCR and use the VCR with an AV cable. To turn the RF converter off, input "00" when setting the RF (when "RF" is displayed) during VCR pre-setting.

3. TEST POINTS FOR TAPE PATH ADJUSTMENT

Test points TP182 (ENV) and TP183 (SW-P) for tape path adjustment are shown in figure below.
For adjustment, refer to the separate volume "VC Mechanism Manual" (MM531683).

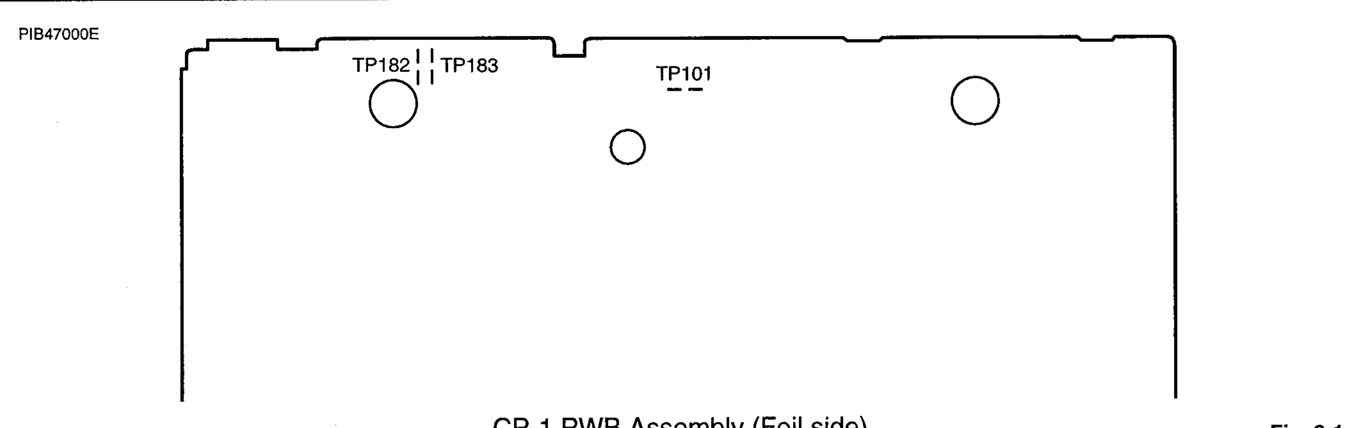


Fig. 3-1

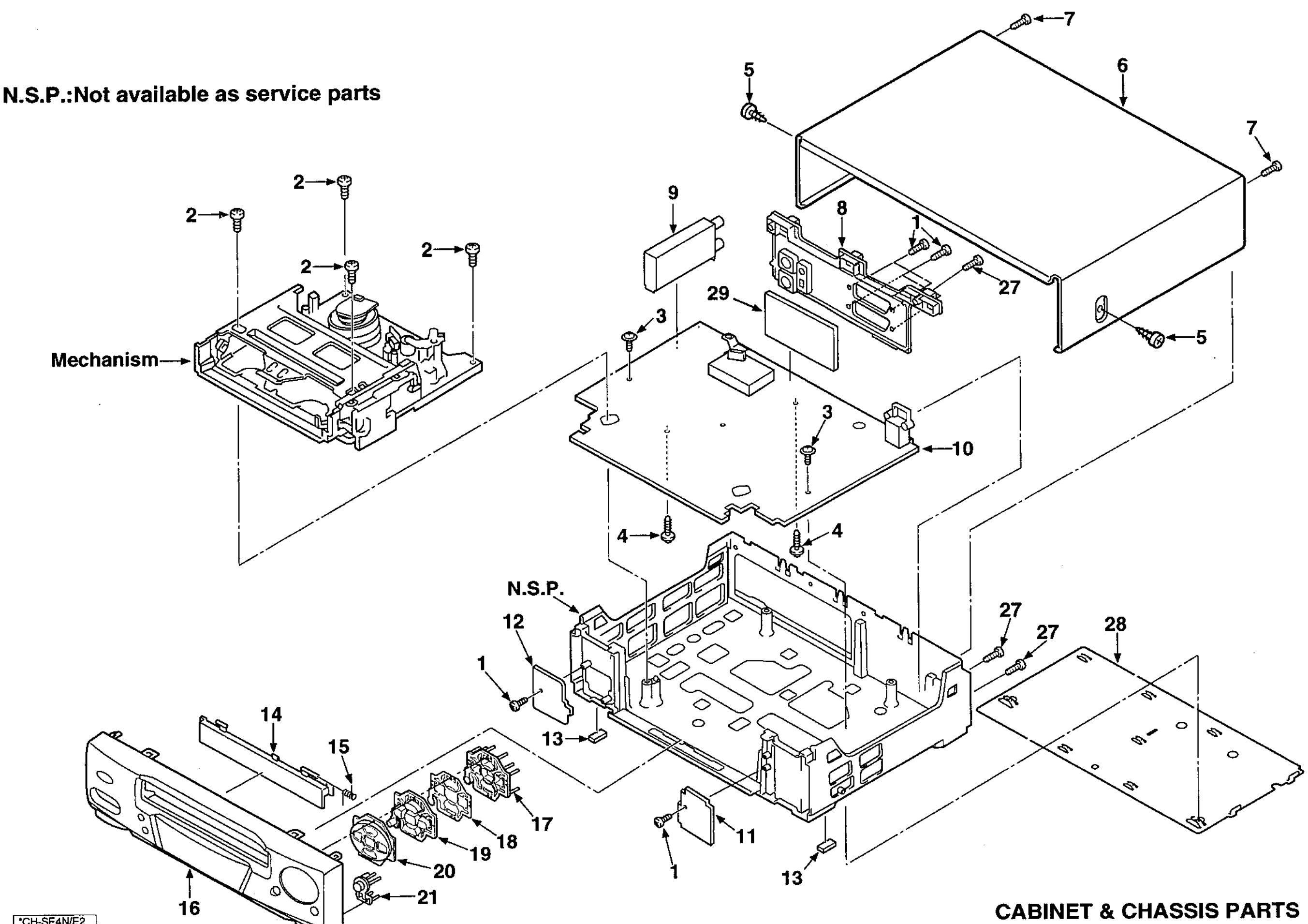
4. PARTS LIST

CABINET & CHASSIS PARTS

LOCATION	PARTS NO.	DESCRIPTION
1	411 137 0007	SCR L-TPG BIN 3X10
2	411 021 7907	SCR S-TPG BIN 4X12
3	411 142 9200	SCR S-TPG PAN+FLG 3X10
4	412 052 5108	SPECIAL SCREW-2.6X12
5	412 028 9406	SPECIAL SCREW
6	613 185 4802	COMPL,COVER TOP,VHR-459EE ONLY
6	613 187 5814	COVER TOP,EXCEPT VHR-459EE
7	411 025 5404	SCR S-TPG BIN 3X12
8	613 183 5047	TERMINAL,EXCEPT VHR-489SP
8	613 184 8221	TERMINAL,VHR-489SP ONLY
9	645 031 0805	TUNER,RF/TU/IF,EXCEPT VHR-459EE
9	645 031 0867	TUNER,RF/TU/IF,VHR-459EE ONLY
10	613 184 8061	COMPL PWB,CP-1-A,VHR-489SP ONLY
10	613 185 2389	COMPL PWB,CP-1-A,VHR-459EV ONLY
10	613 185 2396	COMPL PWB,CP-1-A,VHR-459EE ONLY
11	613 184 1277	COMPL PWB,TM-1,VHR-489SP ONLY
11	613 184 4827	COMPL PWB,TM-1,VHR-459EV ONLY
12	613 184 1215	COMPL PWB,TM-2,VHR-489SP ONLY
12	613 184 4797	COMPL PWB,TM-2,VHR-459EV ONLY
13	613 121 1001	STAND,FELT,(FRONT)
14	613 184 7316	DOOR CASSETTE,VHR-489SP ONLY
14	613 185 4505	DOOR CASSETTE,VHR-459EE ONLY
14	613 186 5594	DOOR CASSETTE,VHR-459EV ONLY
15	613 188 1617	SPRING
16	613 184 7279	ASSY,CABINET FRONT SID,VHR-489SP ONLY
16	613 186 3316	ASSY,CABINET FRONT SID,VHR-459EV ONLY
16	613 185 4468	ASSY,CABINET FRONT SJC,VHR-459EE ONLY
17	613 183 8789	HOLDER 6P,VHR-489SP ONLY
18	613 183 8758	DEC,SHEET,VHR-489SP ONLY
19	613 183 8536	BUTTON,6P,VHR-489SP ONLY
19	613 183 8604	BUTTON,6P,VHR-459EV ONLY
20	613 183 8680	DEC,BUTTON,EXCEPT VHR-459EE
21	613 186 3347	BUTTON,EXCEPT VHR-459EE
27	411 025 5404	SCR S-TPG BIN 3X12
28	613 183 7898	COVER BOTTOM
29	613 184 0867	COMPL PWB,TB-1,EXCEPT VHR-489SP
29	613 184 6463	COMPL PWB,TB-1,VHR-489SP ONLY

NOTE ; The shape of ASSY,CABINET FRONT vary according to the models.

N.S.P.:Not available as service parts

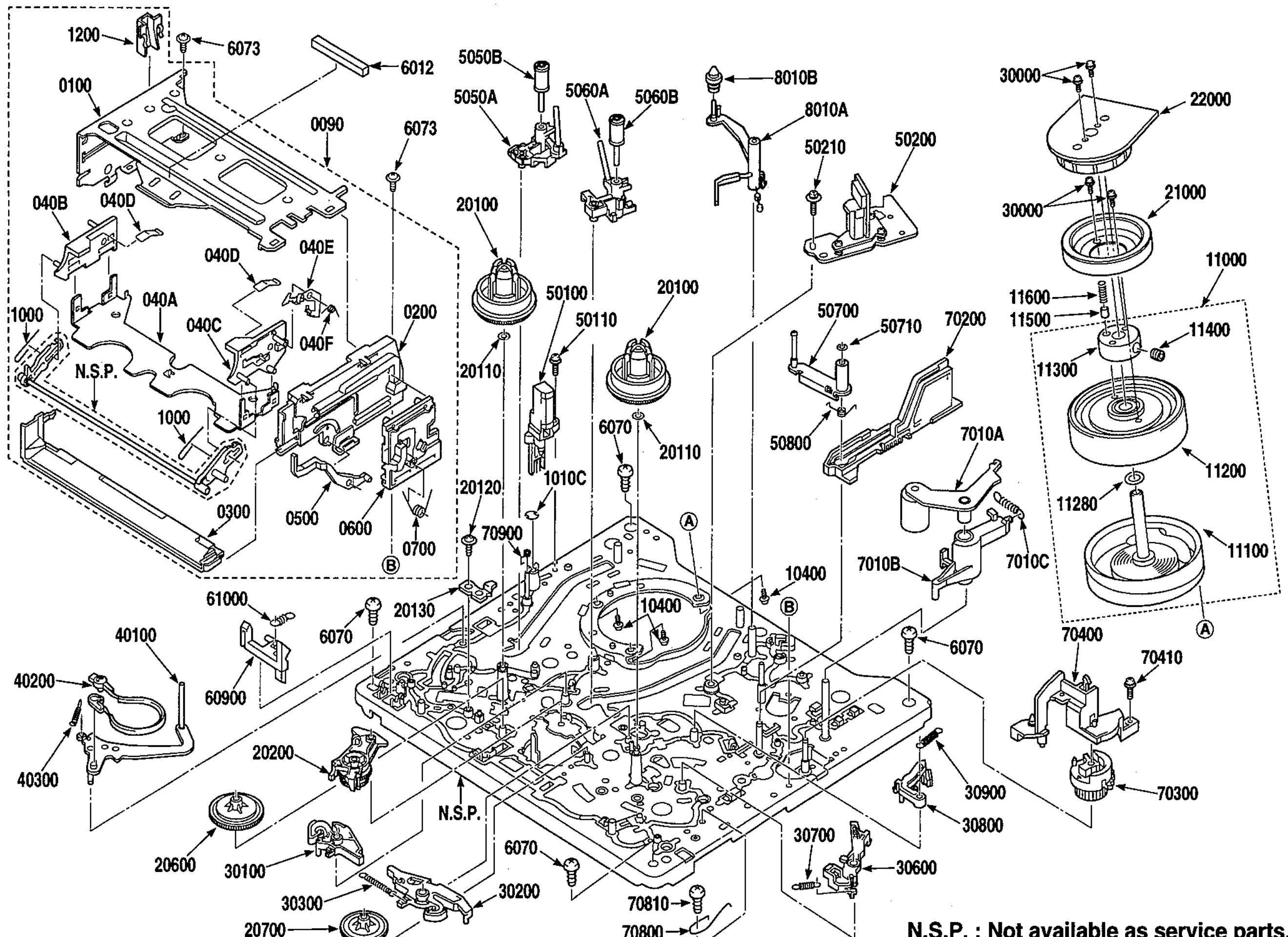


CABINET & CHASSIS PARTS

MECHANISM PARTS

MECHANISM PARTS 1

LOCATION	PARTS NO.	DESCRIPTION
11000	613 182 7424	COMPL,CYLINDER,2N4P-R
11000	613 182 7431	COMPL,CYLINDER,2N4P-R,EXCEPT VHR-459EE
11100	613 182 7844	ASSY,CYLINDER,LWR 4
11100	613 182 7851	ASSY,CYLINDER,LWR 4,EXCEPT VHR-459EE
11200	613 182 7455	ASSY,CYLINDER,UPR 2N4P-R
11200	613 182 7462	ASSY,CYLINDER,UPR 2N4P-R, EXCEPT VHR-459EE
11280	613 182 6366	SPACER,CYLINDER
11300	613 182 6311	MOUNTING,MOTOR,CYLINDER
11400	411 158 0208	SCR SET HEX-SCT 4X6
11500	613 182 6229	EARTH,CHIP,CYLINDER
11600	613 182 6533	SPRING,EARTH,CYLINDER
21000	645 030 3678	MOTOR,ROTOR,CYL DC 2W VC
22000	645 030 3661	MOTOR,STATOR,CYL DC 2W VC
30000	412 036 5001	SPECIAL SCREW 2.3X6
6012	613 151 6618	PAD
6073	411 177 3709	SCR S-TPG CUP 2.6X6
0090	613 187 2646	COMPL,CASSETTE MECHA VC
0100	613 182 3778	STAND,L VC
0200	613 182 3785	STAND,R VC
0300	613 152 0660	FRAME UNDER
040A	613 168 0937	TRAY,VC
040B	613 187 2769	GUIDE,CASSETTE L VC
040C	613 182 3723	GUIDE,CASSETTE R VC
040D	613 182 3815	SPRING,PLATE VC
040E	613 182 3730	LEVER,LID OPENER VC
040F	613 182 3822	SPRING,LID OPENER VC
0500	613 182 3747	LEVER,DOOR OPENER VC
0600	613 182 3808	SLIDE,DRIVE VC
0700	613 182 3839	SPRING,START VC
1000	613 183 8277	SPRING,TRAY VC
1200	613 184 6630	HOOD,SENSOR VC
6070	411 021 7907	SCR S-TPG BIN 4X12
1010C	613 182 4461	GUIDE,S VC
10400	412 052 6204	SPECIAL SCREW-2.6X5.5
20100	613 182 7035	REEL,SPINDLE VC
20110	412 059 1509	SPECIAL WASHER 3.4X0.3
OR	412 058 0503	SPECIAL WASHER 3.4X0.4
OR	412 059 1608	SPECIAL WASHER 3.4X0.5
20120	411 025 5107	SCR S-TPG BIN 2.6X8
20130	613 185 8978	MOUNTING,BT BAND VC
20200	613 186 3804	COMPL,MOUNTING,IDLER VC
20600	613 182 3297	GEAR,REEL S VC
20700	613 182 3303	GEAR,REEL T VC
30100	613 182 4676	ASSY,BRAKE S VC
30200	613 182 4683	ASSY,BRAKE T VC
30300	613 182 6588	SPRING,BRAKE MAIN VC
30600	613 182 4690	ASSY,BRAKE,SOFT T VC
30700	613 182 6595	SPRING,BRAKE SOFT T VC
30800	613 151 8490	ASSY,BRAKE CAPSTAN
30900	613 152 0356	SPRING,BRAKE CAPSTAN
40100	613 151 8759	ASSY,LEVER,BT
40200	613 160 5282	ASSY,BRAKE,BAND
40300	613 152 0271	SPRING,BT
50100	645 030 0950	HEAD,ERASE FULL VC
50110	412 049 1700	SPECIAL SCREW-2.6X10
50200	613 183 9106	ASSY,HEAD R/P ACE VC,VHR-459EE ONLY
50200	613 184 5916	ASSY,HEAD R/P ACE VC,EXCEPT VHR-459EE
50210	412 052 3500	SPECIAL SCREW 2.6X12



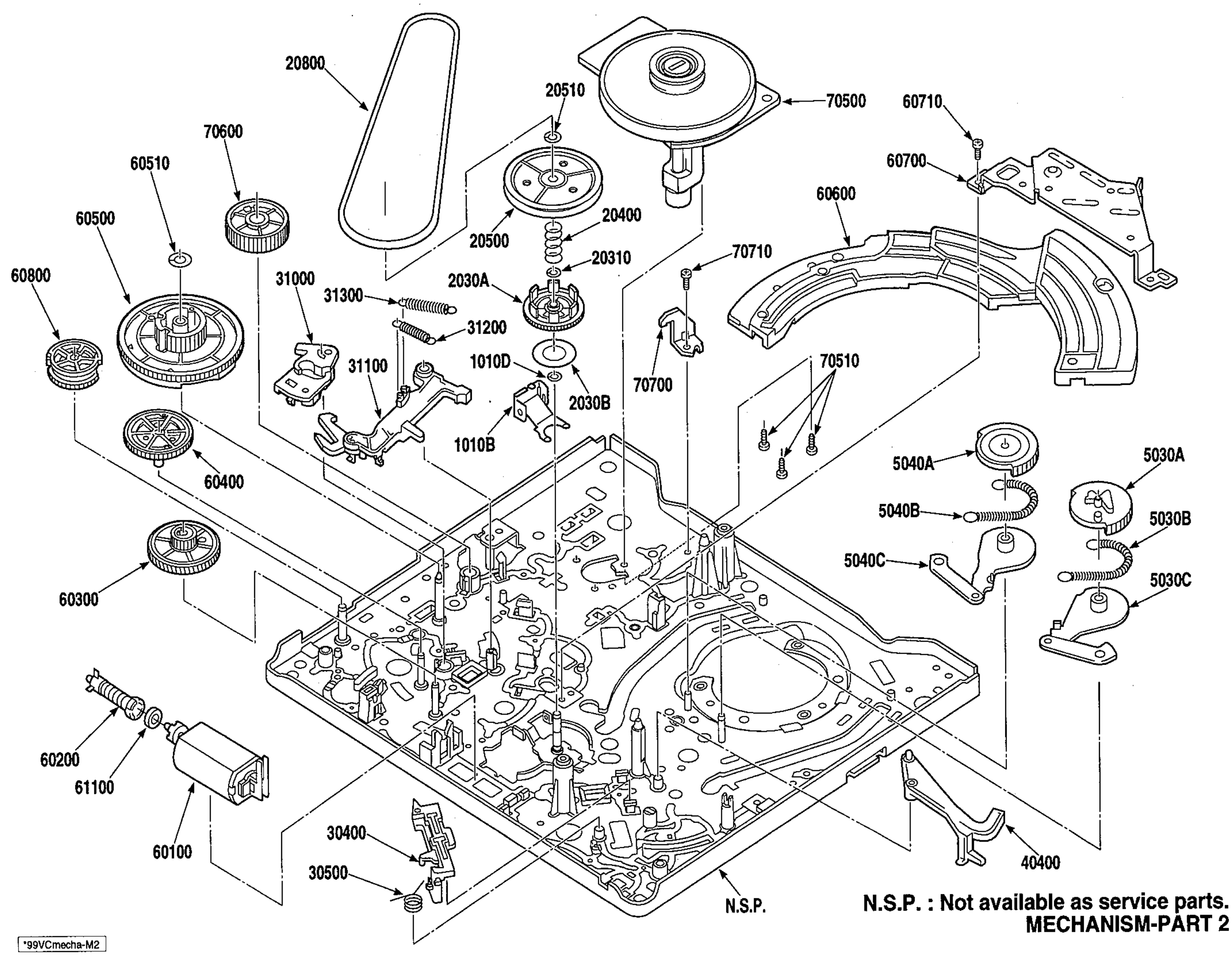
N.S.P. : Not available as service parts.
MECHANISM-PART 1

VCmecha.P-M1

LOCATION	PARTS NO.	DESCRIPTION
5050B	613 184 4384	ASSY,ROLLER,GUIDE
5060A	613 182 3242	ASSY,MOUNTING,INCL T VC
5060B	613 184 4384	ASSY,ROLLER,GUIDE
50700	613 182 5758	ASSY,LEVER LOAD VC
50710	411 109 1902	WASHER Y 3.1X6X0.5
50800	613 182 6540	SPRING,LEVER LOAD VC
60900	613 182 4249	LEVER,EP SW VC
61000	613 182 4256	SPRING,EP SW VC
7010A	613 182 6809	ASSY,LEVER,PINCH VC
7010B	613 182 6328	MOUNTING,LIFT PINCH VC
7010C	613 182 6557	SPRING,PINCH ROLLER VC
70200	613 182 6250	GEAR,RACK PINCH VC
70300	613 182 6243	GEAR,CAM PINCH VC
70400	613 182 6335	MOUNTING,OPENER VC
70410	412 049 1700	SPECIAL SCREW-2.6X10
70800	613 185 7490	SPRING,EARTH VC
70810	412 048 8007	SPECIAL SCREW-2.6X6
70900	613 186 5129	SPRING,GUIDE EARTH VC
8010A	613 171 9606	LEVER,CLEANER,EXCEPT VHR-459EV
8010B	613 171 9439	ASSY,MOUNTING CLEANER, EXCEPT VHR-459EV

MECHANISM PARTS 2

LOCATION	PARTS NO.	DESCRIPTION
1010B	613 182 3358	LEVER,CLUTCH VC
1010D	411 120 1400	WASHER Y 2.6X4.7X0.25
2030A	613 182 3310	GEAR,CLUTCH VC
2030B	412 058 7908	SPECIAL WASHER 7.3X16X0.5
20310	411 109 4002	WASHER Y 2.6X4.7X0.5
20400	613 182 7042	SPRING,CLUTCH VC
20500	613 182 2986	ASSY,PULLEY,FRICTION VC
20510	412 045 4606	SPECIAL WASHER 2.4X6X0.25
20800	613 182 3259	BELT,REEL VC
30400	613 182 6526	SLIDE,SOFT S VC
30500	613 182 6601	SPRING,BRAKE SOFT S VC
31000	613 182 6298	LEVER,CONTROL BRAKE VC
31100	613 182 5765	COMPL,LEVER,ACT BRAKE VC
31200	613 182 6571	SPRING,CHANGE CLUTCH VC
31300	613 182 6564	SPRING,RETURN BRAKE VC
40400	613 153 7583	ASSY,LEVER SPRING BT
5030A	613 152 2763	GEAR,LOAD S
5030B	613 152 0370	SPRING,LOAD S
5030C	613 160 3691	ASSY,LEVER,LOAD S
5040A	613 152 2770	GEAR,LOAD T
5040B	613 152 0363	SPRING,LOAD T
5040C	613 160 3707	ASSY,LEVER,LOAD T
60100	645 029 7014	ASSY,MOTOR LOADING BB VC
60200	613 151 8599	COMPL,GEAR,WORM
60300	613 151 9138	GEAR,WHEEL 1
OR	613 187 4602	GEAR,WHEEL 1
60400	613 160 3790	GEAR,WHEEL 2
60500	613 182 3273	CAM,MAIN VC
60510	412 054 6806	SPECIAL WASHER 3.6X0.5
60600	613 182 3419	SLIDE,CRESCENT VC
60700	613 182 4485	MOUNTING CRESCENT VC
60710	412 048 8007	SPECIAL SCREW-2.6X6
60800	613 182 6236	GEAR,LOCK VC
61100	613 151 9107	DAMPER
70500	645 030 3388	MOTOR,CAPSTAN DC 3W VC
70510	412 048 7604	SPECIAL SCREW-2.6X6
70600	613 182 3327	GEAR,RELAY PINCH VC
70700	613 167 5926	MOUNTING CAPSTAN
70710	412 048 8007	SPECIAL SCREW-2.6X6



N.S.P. : Not available as service parts.
MECHANISM-PART 2

'99VCmecha-M2

ELECTRICAL PARTS

Note:

1. **Materials of Capacitors and Resistors are abbreviated as follows ;**

Resistors		Capacitors	
MT-FILM	Metallized Film Resistor	MT-POLYEST	Metallized Polyester Capacitor
MT-GLAZE	Metallized Glaze Resistor	MT-COMPO	Metallized Composite Capacitor
OXIDE-MT	Oxide Metallized Film Resistor	TA-SOLD	Tantalum Solid Capacitor
		AL-SOLID	Aluminum Solid Capacitor
		NP-ELECT	Non-Polarized Electrolytic Capacitor
		OS-SOLID	Aluminum Solid Capacitors with Organic Semiconductive Electrolytic Capacitor
		DL-ELECT	Double Layered Electrolytic Capacitor

2. **Tolerance of Capacitor (10pF over) and Resistor are noted with follow symboles.**
   F ....1% G ....2% J ....5% K 10%
   M ....20% N ....30% Z ....+80% ~ -20%
3. **Capacitors**
   U : µF P : pF
4. **Inductors**
   UH : µH MH : mH
5. **N.S.P. : Not available as service parts.**

LOCATION	PARTS NO.	DESCRIPTION
COMPL PWB,CP-1-A		
	613 184 8061	VHR-489SP ONLY
	613 185 2389	VHR-459EV ONLY
	613 185 2396	VHR-459EE ONLY
	(CONNECTORS)	
CN181	645 030 7416	SOCKET,FFC 6P (N.S.P)
CN233	645 029 8011	SOCKET,2P (N.S.P)
CN351	645 009 4095	SOCKET,FFC 5P (N.S.P)
CN352	645 008 1842	PLUG,8P (N.S.P)
CN501	⚠ 645 028 4885	SOCKET,INLET AC
OR	⚠ 645 000 5411	SOCKET,INLET AC
CN701	645 009 4118	SOCKET,FFC 7P (N.S.P),EXCEPT VHR-459EE
OR	645 005 4150	SOCKET,7P (N.S.P),EXCEPT VHR-459EE
CN801	645 029 8011	SOCKET,2P (N.S.P)
	(SEMICONDUCTORS)	
Q1001	405 014 4509	TR 2SC2412K-R
OR	405 014 4608	TR 2SC2412K-S
Q1002	405 035 6100	TR 2SC2413K-Q
Q1003	405 014 4509	TR 2SC2412K-R
OR	405 014 4608	TR 2SC2412K-S
Q1004	405 002 0308	TR 2SA1037K-R
OR	405 002 0407	TR 2SA1037K-S
Q1005	405 014 4509	TR 2SC2412K-R
OR	405 014 4608	TR 2SC2412K-S
Q1006	405 014 4509	TR 2SC2412K-R
OR	405 014 4608	TR 2SC2412K-S
Q1007	405 014 4509	TR 2SC2412K-R
OR	405 014 4608	TR 2SC2412K-S
Q1008	405 002 0308	TR 2SA1037K-R,EXCEPT VHR-489SP
OR	405 002 0407	TR 2SA1037K-S,EXCEPT VHR-489SP
Q1009	405 014 4509	TR 2SC2412K-R,EXCEPT VHR-489SP
OR	405 014 4608	TR 2SC2412K-S,EXCEPT VHR-489SP
Q1010	405 002 0308	TR 2SA1037K-R,EXCEPT VHR-489SP
OR	405 002 0407	TR 2SA1037K-S,EXCEPT VHR-489SP
Q1011	405 000 2908	TR DTC114EK
Q1012	405 002 0308	TR 2SA1037K-R
OR	405 002 0407	TR 2SA1037K-S
Q1013	405 035 6100	TR 2SC2413K-Q
Q1401	405 002 0308	TR 2SA1037K-R
OR	405 002 0407	TR 2SA1037K-S
Q1801	405 000 2908	TR DTC114EK
Q1802	405 014 4509	TR 2SC2412K-R
OR	405 014 4608	TR 2SC2412K-S
Q2001	405 003 5609	TR 2SA1318-S
OR	405 003 5708	TR 2SA1318-T
OR	405 003 5807	TR 2SA1318-U
Q2002	405 025 0200	TR 2SD734-G
OR	405 024 9907	TR 2SD734-F
Q2003	405 018 0002	TR 2SC3331-S
OR	405 018 0101	TR 2SC3331-T
OR	405 018 0200	TR 2SC3331-U
Q2004	405 018 0002	TR 2SC3331-S
OR	405 018 0101	TR 2SC3331-T
OR	405 018 0200	TR 2SC3331-U
Q2005	405 003 5609	TR 2SA1318-S
OR	405 003 5708	TR 2SA1318-T
OR	405 003 5807	TR 2SA1318-U
Q2371	405 083 5209	TR DTC343TK,EXCEPT VHR-459EE
Q2372	405 000 2007	TR DTA144EK,EXCEPT VHR-459EE
Q3007	405 015 8407	TR 2SC2812-L5
OR	405 015 8704	TR 2SC2812-L6
OR	405 014 4509	TR 2SC2412K-R
OR	405 014 4608	TR 2SC2412K-S
Q3008	405 015 8407	TR 2SC2812-L5
OR	405 015 8704	TR 2SC2812-L6
OR	405 014 4509	TR 2SC2412K-R
OR	405 014 4608	TR 2SC2412K-S
Q3009	405 002 6508	TR 2SA1179-M5
OR	405 002 6706	TR 2SA1179-M6
OR	405 002 0308	TR 2SA1037K-R
OR	405 002 0407	TR 2SA1037K-S
Q3010	405 002 6508	TR 2SA1179-M5
OR	405 002 6706	TR 2SA1179-M6
OR	405 002 0308	TR 2SA1037K-R
OR	405 002 0407	TR 2SA1037K-S
Q3061	405 002 6508	TR 2SA1179-M5
OR	405 002 6706	TR 2SA1179-M6
OR	405 002 0308	TR 2SA1037K-R
OR	405 002 0407	TR 2SA1037K-S
Q3062	405 002 6508	TR 2SA1179-M5
OR	405 002 6706	TR 2SA1179-M6
OR	405 002 0308	TR 2SA1037K-R
OR	405 002 0407	TR 2SA1037K-S
Q3065	405 014 4509	TR 2SC2412K-R
OR	405 014 4608	TR 2SC2412K-S
Q3303	405 002 6508	TR 2SA1179-M5,VHR-489SP ONLY
OR	405 002 6706	TR 2SA1179-M6,VHR-489SP ONLY
OR	405 002 0308	TR 2SA1037K-R,VHR-489SP ONLY
OR	405 002 0407	TR 2SA1037K-S,VHR-489SP ONLY
Q5002	405 089 2202	TR 2SC4483-T
Q5101	405 125 3200	TR 2SC5070
Q5102	405 089 2103	TR 2SC4483-S
OR	405 089 2202	TR 2SC4483-T
OR	405 104 3108	TR 2SD1858-Q
OR	405 029 4501	TR 2SD1858-R
Q5103	405 013 6801	TR 2SC2274-E
OR	405 013 7006	TR 2SC2274-F
OR	405 013 7204	TR 2SC2274K-E
OR	405 013 7303	TR 2SC2274K-F
Q5104	405 089 2103	TR 2SC4483-S
OR	405 089 2202	TR 2SC4483-T
OR	405 104 3108	TR 2SD1858-Q
OR	405 029 4501	TR 2SD1858-R
Q5110	405 083 6305	TR DTB113ZK
Q5111	405 000 2007	TR DTA144EK
Q5112	405 000 4100	TR DTC124EK
Q5113	405 000 2908	TR DTC114EK
Q5114	405 125 3200	TR 2SC5070
Q5115	405 029 3504	TR DTC144EK

LOCATION	PARTS NO.	DESCRIPTION
Q5116	405 000 4100	TR DTC124EK
Q5117	405 083 6305	TR DTB113ZK
Q5120	405 013 6801	TR 2SC2274-E
OR	405 013 7006	TR 2SC2274-F
OR	405 013 7204	TR 2SC2274K-E
OR	405 013 7303	TR 2SC2274K-F
	(INTEGRATED CIRCUITS)	
IC101	409 435 1406	IC LA71590M-MPB
OR	409 445 6408	IC LA71592M-MPB
IC141	410 324 1605	IC LC74793JM-MPB
IC301	410 342 4206	IC MN101D02GBJ,EXCEPT VHR-459EE
IC301	410 343 4106	IC MN101D02DBG1,VHR-459EE ONLY
IC302	409 440 4508	IC LB1643L
IC304	409 372 1002	IC AT24C08-10PC,EXCEPT VHR-459EE
OR	409 455 0106	IC 24LC08B/P,EXCEPT VHR-459EE
OR	409 458 9304	IC 24LC08B-I/P,EXCEPT VHR-459EE
IC304	410 177 3702	IC AT24C04-10PC,VHR-459EE ONLY
OR	410 172 6906	IC X24C04PC7346,VHR-459EE ONLY
OR	410 189 5800	IC 24LC04B/P,VHR-459EE ONLY
OR	409 348 6901	IC XL24C04P,VHR-459EE ONLY
IC305	409 415 0009	IC BMR03H-04
IC501	409 409 3801	IC MA3810-4105
IC511	409 180 2307	IC UPC1093J
OR	409 067 7203	IC L5431
IC512	409 391 6200	IC PQ09RD11
IC701	409 424 6900	IC MN12510F
	(DIODES)	
D1001	407 012 4406	DIODE 1SS133
D1005	407 012 4406	DIODE 1SS133,EXCEPT VHR-489SP
D1006	407 012 4406	DIODE 1SS133,EXCEPT VHR-489SP
D1009	407 012 4406	DIODE 1SS133,EXCEPT VHR-489SP
D1010	407 012 4406	DIODE 1SS133,EXCEPT VHR-489SP
D1011	407 012 4406	DIODE 1SS133,EXCEPT VHR-489SP
D3001	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D3002	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D3401	407 100 0006	ZENER DIODE MTZJ33C
D3501	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D3502	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D5001	407 197 6509	DIODE DB155G-S
OR	407 104 5304	DIODE S1WB(A)60
D5002	407 004 9808	DIODE DSK10E
D5011	407 198 2401	DIODE SFT14
OR	407 100 6909	DIODE AG01
OR	407 091 6902	DIODE ERA38-04
D5012	407 198 2401	DIODE SFT14
OR	407 100 6909	DIODE AG01
OR	407 091 6902	DIODE ERA38-04
D5013	⚠ 407 169 5608	PHOTO COUPLE PC123U2
D5014	407 078 2705	DIODE 1SS244
D5015	407 078 2705	DIODE 1SS244
D5016	407 099 5402	ZENER DIODE MTZJ6.2B
D5019	407 078 2705	DIODE 1SS244
D5101	408 038 5309	DIODE ERC81-004J11
D5102	407 205 7009	DIODE D2FS6
OR	407 205 7009	DIODE D2FS6
D5103	407 078 2705	DIODE 1SS244
D5104	407 198 2401	DIODE SFT14
OR	407 100 6909	DIODE AG01
OR	407 091 6902	DIODE ERA38-04
D5105	407 167 8007	DIODE D1FL20U
OR	407 167 8007	DIODE D1FL20U
D5107	407 099 5303	ZENER DIODE MTZJ5.6B
D5108	407 099 5303	ZENER DIODE MTZJ5.6B
D5109	407 099 5303	ZENER DIODE MTZJ5.6B
D5110	407 099 6508	ZENER DIODE MTZJ12A
D5111	407 099 5600	ZENER DIODE MTZJ6.8A
D5112	407 091 6902	DIODE ERA38-04
D5115	407 078 2705	DIODE 1SS244
D5116	407 055 4708	ZENER DIODE RD24MB1
OR	407 055 4807	ZENER DIODE RD24M-B2
OR	407 120 7108	ZENER DIODE RD24MB3
D5118	407 150 7703	DIODE RB441Q
D5119	407 150 7703	DIODE RB441Q
D5120	407 150 7703	DIODE RB441Q

LOCATION	PARTS NO.	DESCRIPTION
D5125	407 099 5402	ZENER DIODE MTZJ6.2B
D7001	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D7002	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D7006	407 007 9904	DIODE GMA01,VHR-459EE ONLY
OR	407 012 4406	DIODE 1SS133,VHR-459EE ONLY
D7007	407 007 9904	DIODE GMA01,EXCEPT VHR-459EE
OR	407 012 4406	DIODE 1SS133,EXCEPT VHR-459EE
D7009	407 007 9904	DIODE GMA01,VHR-459EE ONLY
OR	407 012 4406	DIODE 1SS133,VHR-459EE ONLY
D7015	407 007 9904	DIODE GMA01,EXCEPT VHR-459EV
OR	407 012 4406	DIODE 1SS133,EXCEPT VHR-459EV
D7016	407 007 9904	DIODE GMA01,VHR-489SP ONLY
OR	407 012 4406	DIODE 1SS133,VHR-489SP ONLY
D7017	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D7018	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D7019	407 007 9904	DIODE GMA01
OR	407 012 4406	DIODE 1SS133
D7021	407 007 9904	DIODE GMA01,EXCEPT VHR-459EE
OR	407 012 4406	DIODE 1SS133,EXCEPT VHR-459EE
D7029	408 039 9306	LED SLZ-381B-30H-AB,,VHR-459EE ONLY
OR	408 040 6103	LED SEL2410GLF44-C,,VHR-459EE ONLY
OR	408 040 6202	LED SEL2401GLF44-D,,VHR-459EE ONLY
D8001	407 208 6603	PHOTO,DIODE PN205LT.SN
D8002	407 208 6603	PHOTO,DIODE PN205LT.SN
D8003	407 207 0107	LED LN59LT.SL
	(PHOTO COUPLERS)	
PC801	407 206 6704	PHOTO COUPLE SG-269
PC802	407 206 6704	PHOTO COUPLE SG-269
	(CRYSTAL DEVICES)	
X1002	645 000 6012	OSC,CRYSTAL 4.433619MHZ
OR	645 000 6029	OSC,CRYSTAL 4.433619MHZ
OR	645 002 4436	OSC,CRYSTAL 4.433619MHZ
OR	645 014 8378	OSC,CRYSTAL 4.433619MHZ
X3001	613 109 0972	OSC,CRYSTAL 32KHZ
X3002	645 008 7899	OSC,CRYSTAL 14.31818MHZ
OR	645 035 6605	OSC,CRYSTAL 14.31818MHZ
X7001	645 006 3435	OSC,CERAMIC 4.000MHZ
OR	613 124 2142	RESONATOR,CERAMIC 4MHZ
	(INDUCTORS)	
L1002	645 002 1510	INDUCTOR,68U J
OR	645 003 8228	INDUCTOR,68U J
L1003	645 001 4611	INDUCTOR,120U J
OR	645 003 7948	INDUCTOR,120U J
L1004	645 006 3886	INDUCTOR,1U K
L1005	645 003 6934	INDUCTOR,100U J
OR	645 003 7634	INDUCTOR,100U J
L1006	645 025 0644	INDUCTOR,0.75UH
L2004	645 003 6934	INDUCTOR,100U J
OR	645 003 7634	INDUCTOR,100U J
L2341	645 006 3817	INDUCTOR,0.22U K,VHR-489SP ONLY
OR	645 010 6651	INDUCTOR,0.22U M,VHR-489SP ONLY
L3010	645 009 3791	CORE,BEAD
L3061	645 006 3602	INDUCTOR,1.1UH
L3062	645 025 0644	INDUCTOR,0.75UH
L3064	645 025 0644	INDUCTOR,0.75UH
L3065	645 025 0644	INDUCTOR,0.75UH
L3301	645 003 6910	INDUCTOR,10U J
OR	645 003 7627	INDUCTOR,10U J
L5001	⚠ 645 013 5620	LINE FILTER
OR	⚠ 645 035 6704	LINE FILTER
L5101	645 011 6957	INDUCTOR,10U
OR	645 002 4122	INDUCTOR,10U K
L5102	645 011 6957	INDUCTOR,10U
OR	645 002 4122	INDUCTOR,10U K
	(TRANSFORMERS)	
T2001	645 018 3515	TRANS,OSC,70KHZ
T5001	⚠ 645 027 3599	TRANS,POWER,PULSE
	(CAPACITORS)	
C1001	403 192 5905	CERAMIC 0.1U K 25V
C1002	403 130 3109	CERAMIC 0.047U K 50V
C1003	403 109 6308	ELECT 1U M 50V
C1004	403 135 4002	ELECT 47U M 6.3V
C1005	403 068 0409	CERAMIC 0.1U Z 25V
C1006	403 069 5601	CERAMIC 0.01U K 50V

LOCATION	PARTS NO.	DESCRIPTION
C1007	403 020 0409	CERAMIC 27P J 50V
C1008	403 024 7107	CERAMIC 390P J 50V
C1009	403 147 2904	CERAMIC 4.7P C 50V
C1010	403 191 8709	ELECT 1U M 50V
C1011	403 014 9203	CERAMIC 180P J 50V
C1012	403 022 8205	CERAMIC 33P J 50V
C1013	403 139 1502	ELECT 10U M 16V
C1014	403 139 1700	ELECT 33U M 16V
C1015	403 192 5905	CERAMIC 0.1U K 25V, EXCEPT VHR-489SP
C1016	403 139 2608	ELECT 0.47U M 50V
C1017	403 069 5601	CERAMIC 0.01U K 50V
C1019	403 192 5905	CERAMIC 0.1U K 25V
C1020	403 192 5905	CERAMIC 0.1U K 25V
C1022	403 139 2707	ELECT 1U M 50V
C1023	403 139 1502	ELECT 10U M 16V
C1024	403 139 2707	ELECT 1U M 50V
C1025	403 069 5601	CERAMIC 0.01U K 50V
C1026	403 069 5601	CERAMIC 0.01U K 50V
C1027	403 069 5601	CERAMIC 0.01U K 50V
C1028	403 069 5601	CERAMIC 0.01U K 50V
C1029	403 068 0409	CERAMIC 0.1U Z 25V
C1030	403 139 1007	ELECT 47U M 6.3V
C1031	403 069 5601	CERAMIC 0.01U K 50V
C1032	403 139 2707	ELECT 1U M 50V
C1033	403 069 5601	CERAMIC 0.01U K 50V
C1034	403 139 2707	ELECT 1U M 50V
C1035	403 072 1607	CERAMIC 0.022U K 50V
C1036	403 139 1007	ELECT 47U M 6.3V
C1037	403 068 0409	CERAMIC 0.1U Z 25V
C1038	403 139 2707	ELECT 1U M 50V
C1039	403 072 1607	CERAMIC 0.022U K 50V
C1040	403 069 5601	CERAMIC 0.01U K 50V,VHR-459EE ONLY
C1041	403 130 3109	CERAMIC 0.047U K 50V
C1042	403 072 1607	CERAMIC 0.022U K 50V
C1047	403 014 3409	CERAMIC 18P J 50V
C1048	403 013 3004	CERAMIC 150P J 50V
C1049	403 121 9509	CERAMIC 0.1U Z 50V
C1050	403 026 2803	CERAMIC 47P J 50V
C1051	403 026 2803	CERAMIC 47P J 50V,EXCEPT VHR-489SP
C1053	403 135 4101	ELECT 470U M 6.3V,EXCEPT VHR-489SP
C1055	403 069 5601	CERAMIC 0.01U K 50V
C1059	403 130 3109	CERAMIC 0.047U K 50V
C1060	403 068 0409	CERAMIC 0.1U Z 25V
C1062	403 068 0409	CERAMIC 0.1U Z 25V
C1403	403 191 8709	ELECT 1U M 50V
C1404	403 069 9500	CERAMIC 0.01U Z 50V
C1405	403 163 7907	ELECT 47U M 6.3V
C1412	403 191 8709	ELECT 1U M 50V
C1414	403 069 5601	CERAMIC 0.01U K 50V
C1415	403 167 7002	ELECT 4.7U M 50V
C1416	403 215 2508	CERAMIC 0.056U K 50V
C1801	403 026 2803	CERAMIC 47P J 50V
C1802	403 163 7907	ELECT 47U M 6.3V
C1803	403 068 0409	CERAMIC 0.1U Z 25V
C1804	403 191 8709	ELECT 1U M 50V
C1805	403 069 5601	CERAMIC 0.01U K 50V
C1806	403 069 5601	CERAMIC 0.01U K 50V
C1807	403 069 5601	CERAMIC 0.01U K 50V
C1808	403 022 8205	CERAMIC 33P J 50V
C1809	403 022 8205	CERAMIC 33P J 50V
C1810	403 022 8205	CERAMIC 33P J 50V
C1811	403 022 8205	CERAMIC 33P J 50V
C2001	403 068 0409	CERAMIC 0.1U Z 25V
C2002	403 135 4002	ELECT 47U M 6.3V
C2003	403 068 0409	CERAMIC 0.1U Z 25V
C2004	403 135 3708	ELECT 33U M 6.3V
C2006	403 135 3708	ELECT 33U M 6.3V
C2007	403 068 0409	CERAMIC 0.1U Z 25V, EXCEPT VHR-489SP
C2008	403 074 7607	CERAMIC 5600P K 50V
C2009	403 121 3507	ELECT 4.7U M 50V
C2010	403 068 0409	CERAMIC 0.1U Z 25V
C2011	403 135 4002	ELECT 47U M 6.3V
C2012	403 081 3302	POLYPRO 0.022U J 100V
C2013	403 069 5601	CERAMIC 0.01U K 50V
C2014	403 073 1200	CERAMIC 0.033U K 50V
C2015	403 163 7907	ELECT 47U M 6.3V

LOCATION	PARTS NO.	DESCRIPTION
C2016	403 109 6308	ELECT 1U M 50V
C2017	403 070 8806	CERAMIC 1500P K 50V
C2019	403 069 1702	CERAMIC 1000P K 50V
C2020	403 069 5601	CERAMIC 0.01U K 50V
C2021	403 150 6500	ELECT 22U M 16V
C2022	403 167 7002	ELECT 4.7U M 50V
C2023	403 069 1702	CERAMIC 1000P K 50V
C2328	403 069 5601	CERAMIC 0.01U K 50V
C2341	403 070 7205	CERAMIC 150P J 50V,VHR-489SP ONLY
C2372	403 074 7607	CERAMIC 5600P K 50V
C3001	403 008 7505	CERAMIC 10P D 50V
C3002	403 008 7505	CERAMIC 10P D 50V
C3003	403 018 0503	CERAMIC 22P J 50V
C3004	403 014 3409	CERAMIC 18P J 50V
C3005	403 069 5601	CERAMIC 0.01U K 50V
C3006	403 069 5601	CERAMIC 0.01U K 50V
C3008	403 189 2405	ELECT 10U M 16V
C3011	403 069 5601	CERAMIC 0.01U K 50V
C3013	403 069 5601	CERAMIC 0.01U K 50V
C3014	403 069 5601	CERAMIC 0.01U K 50V
C3015	403 135 3807	ELECT 330U M 6.3V
C3016	403 069 5601	CERAMIC 0.01U K 50V
C3017	403 135 3609	ELECT 220U M 6.3V,VHR-459EV ONLY
C3017	403 333 1001	DL-ELECT 0.1F Z 5.5V, EXCEPT VHR-459EV
C3018	403 163 8409	ELECT 47U M 16V
C3019	403 010 1102	CERAMIC 1000P J 50V
C3020	403 001 1906	CERAMIC 0.01U M 16V
C3025	403 028 4102	CERAMIC 56P J 50V
C3026	403 028 4102	CERAMIC 56P J 50V
C3027	403 068 0409	CERAMIC 0.1U Z 25V
C3037	403 069 5601	CERAMIC 0.01U K 50V
C3040	403 191 8808	ELECT 2.2U M 50V
C3041	403 068 0409	CERAMIC 0.1U Z 25V
C3042	403 107 9905	ELECT 10U M 16V
C3043	403 010 1102	CERAMIC 1000P J 50V
C3044	403 139 1502	ELECT 10U M 16V
C3045	403 010 1102	CERAMIC 1000P J 50V
C3059	403 069 5601	CERAMIC 0.01U K 50V
C3061	403 068 0409	CERAMIC 0.1U Z 25V
C3064	403 086 2805	NP-ELECT 1U M 50V
C3065	403 139 1502	ELECT 10U M 16V
C3066	403 193 7809	ELECT 100U M 16V
C3067	403 068 0409	CERAMIC 0.1U Z 25V
C3068	403 010 1102	CERAMIC 1000P J 50V
C3085	403 068 8801	CERAMIC 100P J 50V
C3301	403 107 9905	ELECT 10U M 16V
C3302	403 107 9905	ELECT 10U M 16V
C3305	403 026 2803	CERAMIC 47P J 50V
C3309	403 070 2606	CERAMIC 0.1U Z 50V
C3310	403 070 2606	CERAMIC 0.1U Z 50V
C3313	403 068 3608	CERAMIC 0.033U Z 25V
C3314	403 107 9905	ELECT 10U M 16V
C3317	403 009 5708	CERAMIC 100P J 50V
C3318	403 011 4904	CERAMIC 120P J 50V
C3319	403 070 2606	CERAMIC 0.1U Z 50V
C3320	403 030 6903	CERAMIC 68P J 50V
C3321	403 009 5708	CERAMIC 100P J 50V
C3335	403 008 7505	CERAMIC 10P D 50V
C3404	403 193 8905	ELECT 22U M 50V
C3502	403 069 5601	CERAMIC 0.01U K 50V
C3503	403 018 7403	CERAMIC 220P J 50V
C3504	403 069 5601	CERAMIC 0.01U K 50V
C3505	403 139 2707	ELECT 1U M 50V
C3506	403 139 1205	ELECT 22U M 10V
C3507	403 193 7601	ELECT 220U M 6.3V
C3508	403 162 1807	ELECT 22U M 10V
C3510	403 069 5601	CERAMIC 0.01U K 50V
C3513	403 215 1808	CERAMIC 2200P J 50V
C3514	403 073 4201	CERAMIC 3900P K 50V
C3516	403 068 0409	CERAMIC 0.1U Z 25V
C3517	403 193 7601	ELECT 220U M 6.3V
C3519	403 068 0409	CERAMIC 0.1U Z 25V
C3520	403 068 6203	CERAMIC 0.068U Z 25V
C3521	403 174 5909	CERAMIC 0.022U Z 25V
C3522	403 069 5601	CERAMIC 0.01U K 50V
C3524	403 010 1102	CERAMIC 1000P J 50V, EXCEPT VHR-459EE

LOCATION	PARTS NO.	DESCRIPTION
C3525	403 009 5708	CERAMIC 100P J 50V, EXCEPT VHR-459EE
C3526	403 071 8102	CERAMIC 2200P K 50V, EXCEPT VHR-459EE
C3527	403 069 5601	CERAMIC 0.01U K 50V, EXCEPT VHR-459EE
C3528	403 163 8409	ELECT 47U M 16V
C3530	403 068 0409	CERAMIC 0.1U Z 25V
C3531	403 068 0409	CERAMIC 0.1U Z 25V
C5001	⚠ 404 070 4201	MT-POLYEST 0.068U M 250V
C5002	⚠ 404 070 4201	MT-POLYEST 0.068U M 250V
C5005	⚠ 404 074 1602	CERAMIC 1000P M 250V
C5007	⚠ 404 074 1602	CERAMIC 1000P M 250V
C5010	403 249 0204	ELECT 47U M 400V
C5012	403 247 3702	CERAMIC 3300P K 1K
C5013	403 222 1303	CERAMIC 1000P K 1KV
C5014	403 192 5905	CERAMIC 0.1U K 25V
C5015	403 069 5601	CERAMIC 0.01U K 50V
C5016	403 192 5905	CERAMIC 0.1U K 25V
C5101	403 314 0207	ELECT 1000U M 16V
C5102	403 147 9200	ELECT 1000U M 6.3V
C5103	403 314 0108	ELECT 470U M 16V
C5104	403 125 5507	ELECT 1000U M 16V
C5105	403 304 9302	ELECT 47U M 50V
C5106	403 301 1309	ELECT 47U M 35V
C5107	403 301 1507	ELECT 220U M 6.3V
C5111	403 107 9905	ELECT 10U M 16V
C5112	403 189 2405	ELECT 10U M 16V
C5113	403 189 2405	ELECT 10U M 16V
C5114	403 107 9905	ELECT 10U M 16V
C5115	403 135 7805	ELECT 3.3U M 50V
C5116	403 107 9905	ELECT 10U M 16V
C5117	403 135 7805	ELECT 3.3U M 50V
C5119	403 189 2405	ELECT 10U M 16V
C5122	403 192 5905	CERAMIC 0.1U K 25V
C5125	403 192 5905	CERAMIC 0.1U K 25V
C5127	403 192 5905	CERAMIC 0.1U K 25V
C5128	403 192 5905	CERAMIC 0.1U K 25V
C5129	403 192 5905	CERAMIC 0.1U K 25V
C5135	403 068 0409	CERAMIC 0.1U Z 25V
C7001	403 028 9909	CERAMIC 560P J 50V
C7002	403 028 9909	CERAMIC 560P J 50V
C7003	403 028 9909	CERAMIC 560P J 50V
C7004	403 028 9909	CERAMIC 560P J 50V
C7005	403 167 7002	ELECT 4.7U M 50V
C7006	403 068 0409	CERAMIC 0.1U Z 25V
C8001	403 068 0409	CERAMIC 0.1U Z 25V
	(RESISTORS)	
R1001	401 038 3702	MT-GLAZE 33K JA 1/10W
R1002	401 037 9309	MT-GLAZE 18K JA 1/10W
R1003	401 037 5608	MT-GLAZE 10K JA 1/10W
R1004	401 037 9309	MT-GLAZE 18K JA 1/10W
R1006	401 037 5400	MT-GLAZE 1K JA 1/10W
R1007	401 038 3504	MT-GLAZE 330 JA 1/10W
R1008	401 038 3504	MT-GLAZE 330 JA 1/10W
R1009	401 038 9001	MT-GLAZE 680 JA 1/10W
R1010	401 038 2101	MT-GLAZE 2.7K JA 1/10W
R1011	401 038 6406	MT-GLAZE 4.7K JA 1/10W
R1012	401 037 9200	MT-GLAZE 1.8K JA 1/10W
R1013	401 038 5003	MT-GLAZE 390 JA 1/10W
R1014	401 037 5400	MT-GLAZE 1K JA 1/10W
R1015	401 037 5707	MT-GLAZE 100K JA 1/10W
R1017	401 038 5102	MT-GLAZE 3.9K JA 1/10W
R1018	401 037 5400	MT-GLAZE 1K JA 1/10W
R1019	401 037 6704	MT-GLAZE 1.2K JA 1/10W
R1020	401 037 5400	MT-GLAZE 1K JA 1/10W
R1021	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
R1022	401 039 0403	MT-GLAZE 8.2K JA 1/10W
R1023	401 037 7909	MT-GLAZE 1.5K JA 1/10W,VHR-459EE ONLY
R1024	401 038 3603	MT-GLAZE 3.3K JA 1/10W,VHR-459EE ONLY
R1025	401 037 5400	MT-GLAZE 1K JA 1/10W
R1026	401 038 5102	MT-GLAZE 3.9K JA 1/10W
R1030	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
R1031	401 037 5608	MT-GLAZE 10K JA 1/10W
R1032	401 037 5806	MT-GLAZE 1M JA 1/10W, EXCEPT VHR-459EE
R1034	401 037 5202	MT-GLAZE 100 JA 1/10W
R1035	401 037 8005	MT-GLAZE 15K JA 1/10W

LOCATION	PARTS NO.	DESCRIPTION
R1039	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
R1040	401 037 5202	MT-GLAZE 100 JA 1/10W
R1041	401 038 2101	MT-GLAZE 2.7K JA 1/10W
R1042	401 037 8005	MT-GLAZE 15K JA 1/10W
R1044	401 037 6704	MT-GLAZE 1.2K JA 1/10W
R1045	401 037 6704	MT-GLAZE 1.2K JA 1/10W
R1046	401 037 5400	MT-GLAZE 1K JA 1/10W
R1047	401 038 5003	MT-GLAZE 390 JA 1/10W, EXCEPT VHR-489SP
R1048	401 018 2701	CARBON 330 JA 1/4W, EXCEPT VHR-489SP
R1049	401 018 2701	CARBON 330 JA 1/4W, EXCEPT VHR-489SP
R1050	401 038 7700	MT-GLAZE 5.6K JA 1/10W,EXCEPT VHR-489SP
R1051	401 038 7700	MT-GLAZE 5.6K JA 1/10W,EXCEPT VHR-489SP
R1052	401 012 4404	CARBON 100 JA 1/4W, EXCEPT VHR-489SP
R1053	401 037 5608	MT-GLAZE 10K JA 1/10W, EXCEPT VHR-489SP
R1054	401 037 5608	MT-GLAZE 10K JA 1/10W, EXCEPT VHR-489SP
R1055	401 038 6406	MT-GLAZE 4.7K JA 1/10W,EXCEPT VHR-489SP
R1056	401 019 0904	CARBON 390 JA 1/4W, EXCEPT VHR-489SP
R1057	401 037 5004	MT-GLAZE 0.000 ZA 1/10W,VHR-489SP ONLY
R1057	401 038 9506	MT-GLAZE 75 JA 1/10W, EXCEPT VHR-489SP
R1059	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
R1061	401 038 0800	MT-GLAZE 22K JA 1/10W
R1062	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
R1063	401 037 9200	MT-GLAZE 1.8K JA 1/10W
R1064	401 038 0800	MT-GLAZE 22K JA 1/10W
R1067	401 037 5400	MT-GLAZE 1K JA 1/10W,VHR-489SP ONLY
R1068	401 037 5400	MT-GLAZE 1K JA 1/10W,VHR-489SP ONLY
R1072	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
R1073	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
R1411	401 038 3603	MT-GLAZE 3.3K JA 1/10W
R1413	401 037 5608	MT-GLAZE 10K JA 1/10W
R1414	401 038 2101	MT-GLAZE 2.7K JA 1/10W
R1415	401 037 5608	MT-GLAZE 10K JA 1/10W
R1416	401 038 7700	MT-GLAZE 5.6K JA 1/10W
R1417	401 037 5608	MT-GLAZE 10K JA 1/10W
R1805	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
R1806	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
R1807	401 037 5608	MT-GLAZE 10K JA 1/10W
R1808	401 037 5608	MT-GLAZE 10K JA 1/10W
R1809	401 038 3702	MT-GLAZE 33K JA 1/10W
R1810	401 038 3603	MT-GLAZE 3.3K JA 1/10W
R1811	401 038 2002	MT-GLAZE 270 JA 1/10W
R1812	401 038 2002	MT-GLAZE 270 JA 1/10W
R2001	401 038 3702	MT-GLAZE 33K JA 1/10W, EXCEPT VHR-489SP
R2002	401 039 0403	MT-GLAZE 8.2K JA 1/10W,EXCEPT VHR-489SP
R2005	401 038 3702	MT-GLAZE 33K JA 1/10W
R2006	401 037 5608	MT-GLAZE 10K JA 1/10W
R2007	401 038 3900	MT-GLAZE 3.3M JA 1/10W
R2008	401 037 5608	MT-GLAZE 10K JA 1/10W
R2009	401 039 0403	MT-GLAZE 8.2K JA 1/10W
R2011	401 038 3603	MT-GLAZE 3.3K JA 1/10W
R2012	401 038 0800	MT-GLAZE 22K JA 1/10W
R2013	401 038 6406	MT-GLAZE 4.7K JA 1/10W
R2014	401 038 7601	MT-GLAZE 560 JA 1/10W
R2015	401 038 6208	MT-GLAZE 47 JA 1/10W
R2016	401 038 2101	MT-GLAZE 2.7K JA 1/10W
R2017	401 011 8809	CARBON 1 JA 1/4W
R2018	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
R2019	401 038 0701	MT-GLAZE 2.2K JA 1/10W
R2020	401 037 5400	MT-GLAZE 1K JA 1/10W
R2021	401 037 5608	MT-GLAZE 10K JA 1/10W
R2022	401 038 0800	MT-GLAZE 22K JA 1/10W
R2023	401 037 6803	MT-GLAZE 12K JA 1/10W
R2024	401 038 6406	MT-GLAZE 4.7K JA 1/10W
R2025	401 037 6803	MT-GLAZE 12K JA 1/10W
R2026	401 038 3801	MT-GLAZE 330K JA 1/10W
R2027	401 037 7206	MT-GLAZE 130 JA 1/10W
R2028	401 037 7305	MT-GLAZE 1.3K JA 1/10W
R2029	401 038 2200	MT-GLAZE 27K JA 1/10W
R2331	401 037 6704	MT-GLAZE 1.2K JA 1/10W

LOCATION	PARTS NO.	DESCRIPTION
R2332	401 038 2101	MT-GLAZE 2.7K JA 1/10W
R2380	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
R2381	401 037 5400	MT-GLAZE 1K JA 1/10W
R3001	⚠ 402 067 7402	FUSIBLE RES 3.3 JA 1/2W
R3002	401 038 0800	MT-GLAZE 22K JA 1/10W
R3003	401 038 0800	MT-GLAZE 22K JA 1/10W
R3004	401 037 7909	MT-GLAZE 1.5K JA 1/10W
R3005	401 037 9200	MT-GLAZE 1.8K JA 1/10W
R3006	401 038 3009	MT-GLAZE 3K JA 1/10W
R3008	401 038 6406	MT-GLAZE 4.7K JA 1/10W
R3009	401 038 6406	MT-GLAZE 4.7K JA 1/10W
R3010	401 038 3801	MT-GLAZE 330K JA 1/10W
R3011	401 038 6406	MT-GLAZE 4.7K JA 1/10W
R3012	401 038 0602	MT-GLAZE 220 JA 1/10W
R3013	401 038 6406	MT-GLAZE 4.7K JA 1/10W
R3014	401 037 8005	MT-GLAZE 15K JA 1/10W
R3015	401 037 8005	MT-GLAZE 15K JA 1/10W
R3016	401 037 7909	MT-GLAZE 1.5K JA 1/10W
R3017	401 038 6406	MT-GLAZE 4.7K JA 1/10W
R3018	401 037 5608	MT-GLAZE 10K JA 1/10W
R3019	401 037 5707	MT-GLAZE 100K JA 1/10W
R3021	401 038 6406	MT-GLAZE 4.7K JA 1/10W
R3022	401 037 9200	MT-GLAZE 1.8K JA 1/10W
R3023	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
R3024	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
R3029	401 037 5400	MT-GLAZE 1K JA 1/10W
R3032	401 038 5300	MT-GLAZE 39K JA 1/10W
R3035	401 038 0800	MT-GLAZE 22K JA 1/10W
R3036	401 038 0800	MT-GLAZE 22K JA 1/10W
R3038	401 038 6406	MT-GLAZE 4.7K JA 1/10W
R3039	401 037 5400	MT-GLAZE 1K JA 1/10W
R3040	401 037 5400	MT-GLAZE 1K JA 1/10W
R3045	401 020 0702	CARBON 470 JA 1/4W, EXCEPT VHR-459EE
R3064	401 038 0800	MT-GLAZE 22K JA 1/10W
R3065	401 037 8203	MT-GLAZE 1.5M JA 1/10W
R3066	401 038 3702	MT-GLAZE 33K JA 1/10W
R3067	401 038 6505	MT-GLAZE 47K JA 1/10W
R3068	401 038 0800	MT-GLAZE 22K JA 1/10W
R3069	401 037 8203	MT-GLAZE 1.5M JA 1/10W
R3070	401 038 3702	MT-GLAZE 33K JA 1/10W
R3071	401 038 6505	MT-GLAZE 47K JA 1/10W
R3072	401 037 7800	MT-GLAZE 150 JA 1/10W
R3073	401 037 8104	MT-GLAZE 150K JA 1/10W
R3074	401 037 9200	MT-GLAZE 1.8K JA 1/10W
R3075	401 038 3504	MT-GLAZE 330 JA 1/10W
R3076	401 037 5400	MT-GLAZE 1K JA 1/10W
R3077	401 037 9200	MT-GLAZE 1.8K JA 1/10W
R3078	401 012 4404	CARBON 100 JA 1/4W
R3094	401 037 9309	MT-GLAZE 18K JA 1/10W
R3095	401 037 5400	MT-GLAZE 1K JA 1/10W
R3301	401 038 5003	MT-GLAZE 390 JA 1/10W
R3302	401 037 7909	MT-GLAZE 1.5K JA 1/10W
R3309	⚠ 402 078 2908	FUSIBLE RES 680 GA 1/4W
R3310	401 038 3504	MT-GLAZE 330 JA 1/10W,VHR-489SP ONLY
R3311	401 038 5003	MT-GLAZE 390 JA 1/10W,VHR-489SP ONLY
R3312	401 038 3603	MT-GLAZE 3.3K JA 1/10W
R3313	401 038 6406	MT-GLAZE 4.7K JA 1/10W
R3314	401 037 5400	MT-GLAZE 1K JA 1/10W,VHR-489SP ONLY
R3501	401 038 0701	MT-GLAZE 2.2K JA 1/10W
R3502	401 038 0909	MT-GLAZE 220K JA 1/10W
R3503	401 037 5400	MT-GLAZE 1K JA 1/10W
R3509	401 037 5608	MT-GLAZE 10K JA 1/10W
R3510	401 038 9001	MT-GLAZE 680 JA 1/10W
R3511	401 038 9001	MT-GLAZE 680 JA 1/10W
R3514	401 038 3702	MT-GLAZE 33K JA 1/10W
R3515	401 037 5608	MT-GLAZE 10K JA 1/10W
R3516	401 038 3702	MT-GLAZE 33K JA 1/10W
R3517	401 037 5608	MT-GLAZE 10K JA 1/10W
R3519	401 037 5400	MT-GLAZE 1K JA 1/10W
R3520	401 037 5707	MT-GLAZE 100K JA 1/10W
R3521	401 037 5400	MT-GLAZE 1K JA 1/10W
R3522	401 038 0602	MT-GLAZE 220 JA 1/10W, EXCEPT VHR-459EE
R3523	401 037 5202	MT-GLAZE 100 JA 1/10W, EXCEPT VHR-459EE
R3524	401 037 5400	MT-GLAZE 1K JA 1/10W
R3525	401 038 5904	MT-GLAZE 4.3K JA 1/10W

LOCATION	PARTS NO.	DESCRIPTION
R3526	401 037 5400	MT-GLAZE 1K JA 1/10W
R3527	401 038 5904	MT-GLAZE 4.3K JA 1/10W
R3528	401 037 5400	MT-GLAZE 1K JA 1/10W
R3529	401 038 5904	MT-GLAZE 4.3K JA 1/10W
R3531	401 037 5608	MT-GLAZE 10K JA 1/10W
R3532	401 038 0800	MT-GLAZE 22K JA 1/10W
R3533	401 038 9209	MT-GLAZE 6.8K JA 1/10W
R3535	401 037 5608	MT-GLAZE 10K JA 1/10W
R3537	401 037 5608	MT-GLAZE 10K JA 1/10W
R3538	401 037 5608	MT-GLAZE 10K JA 1/10W
R3539	401 012 5609	CARBON 1K JA 1/4W
R5001	402 013 9108	SOLID 2.7M KB 1/2W
R5002	401 021 4907	CARBON 560K JA 1/4W
R5003	401 021 4907	CARBON 560K JA 1/4W
R5010	401 060 9901	OXIDE-MT 3.3 JA 1W
R5011	401 015 0403	CARBON 18 JA 1/4W
R5012	401 064 7309	OXIDE-MT 100 JA 2W
R5013	401 037 5400	MT-GLAZE 1K JA 1/10W
R5014	401 038 5003	MT-GLAZE 390 JA 1/10W
R5015	401 037 6704	MT-GLAZE 1.2K JA 1/10W
R5016	401 038 9001	MT-GLAZE 680 JA 1/10W
R5017	401 038 2101	MT-GLAZE 2.7K JA 1/10W
R5101	401 019 0904	CARBON 390 JA 1/4W
R5102	401 037 7800	MT-GLAZE 150 JA 1/10W
R5103	401 038 7601	MT-GLAZE 560 JA 1/10W
R5104	401 012 6903	CARBON 10K JA 1/4W
R5105	401 016 2505	CARBON 220 JA 1/4W
R5106	401 020 0702	CARBON 470 JA 1/4W
R5108	401 037 9200	MT-GLAZE 1.8K JA 1/10W
R5109	401 038 3603	MT-GLAZE 3.3K JA 1/10W
R5110	⚠ 402 080 0206	FUSIBLE RES 27 JA 1/4W
R5111	401 038 7601	MT-GLAZE 560 JA 1/10W
R5113	401 037 5608	MT-GLAZE 10K JA 1/10W
R5116	401 038 2101	MT-GLAZE 2.7K JA 1/10W
R5119	401 038 6505	MT-GLAZE 47K JA 1/10W
R5120	⚠ 402 004 0107	FUSIBLE RES 10 JA 1/4W
R5121	401 017 7509	CARBON 3.9 JA 1/4W
R5122	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
R5123	401 039 0304	MT-GLAZE 820 JA 1/10W
R5126	401 037 5400	MT-GLAZE 1K JA 1/10W
R5127	401 037 5400	MT-GLAZE 1K JA 1/10W
R5135	401 037 6605	MT-GLAZE 120 JA 1/10W
R7001	401 037 5608	MT-GLAZE 10K JA 1/10W
R7002	401 037 5608	MT-GLAZE 10K JA 1/10W
R7003	401 037 5608	MT-GLAZE 10K JA 1/10W
R7004	401 037 5608	MT-GLAZE 10K JA 1/10W
R7005	401 038 7601	MT-GLAZE 560 JA 1/10W
R7006	401 038 7601	MT-GLAZE 560 JA 1/10W
R7007	401 038 7601	MT-GLAZE 560 JA 1/10W
R7008	401 038 7601	MT-GLAZE 560 JA 1/10W
R7009	401 038 9308	MT-GLAZE 68K JA 1/10W
R7010	401 038 9308	MT-GLAZE 68K JA 1/10W
R7011	401 038 9308	MT-GLAZE 68K JA 1/10W
R7012	401 038 9308	MT-GLAZE 68K JA 1/10W
R7013	401 038 9308	MT-GLAZE 68K JA 1/10W
R7018	401 016 2505	CARBON 220 JA 1/4W,VHR-459EE ONLY
R8003	401 017 0708	CARBON 270 JA 1/4W
R8004	401 014 2804	CARBON 150 JA 1/4W
R8005	401 017 0708	CARBON 270 JA 1/4W
	(JUMPERS)	
	401 037 5004	MT-GLAZE 0.000 ZA 1/10W
	(SWITCHES)	
S7001	645 008 8049	SWITCH,PUSH 1P-1T, REC,VHR-459EE ONLY
OR	645 006 2797	SWITCH,PUSH 1P-1T, REC,VHR-459EE ONLY
OR	645 001 9777	SWITCH,PUSH 1P-1T, REC,VHR-459EE ONLY
S7002	645 008 8049	SWITCH,PUSH 1P-1T, CH UP
OR	645 006 2797	SWITCH,PUSH 1P-1T, CH UP
OR	645 001 9777	SWITCH,PUSH 1P-1T, CH UP
S7003	645 008 8049	SWITCH,PUSH 1P-1T, FF,VHR-459EE ONLY
OR	645 006 2797	SWITCH,PUSH 1P-1T, FF,VHR-459EE ONLY
OR	645 001 9777	SWITCH,PUSH 1P-1T, FF,VHR-459EE ONLY
S7004	645 008 8063	SWITCH,PUSH 1P-1T, CH DOWN, EXCEPT VHR-459EE
S7004	645 008 8049	SWITCH,PUSH 1P-1T, CH DOWN, VHR-459EE ONLY
OR	645 006 2797	SWITCH,PUSH 1P-1T, CH DOWN, VHR-459EE ONLY

LOCATION	PARTS NO.	DESCRIPTION
S7004	645 001 9777	SWITCH,PUSH 1P-1T, CH DOWN, VHR-459EE ONLY
S7005	645 008 8049	SWITCH,PUSH 1P-1T, REW,VHR-459EE ONLY
OR	645 006 2797	SWITCH,PUSH 1P-1T, REW,VHR-459EE ONLY
OR	645 001 9777	SWITCH,PUSH 1P-1T, REW,VHR-459EE ONLY
S7006	645 008 8049	SWITCH,PUSH 1P-1T, POWER, VHR-459EE ONLY
OR	645 006 2797	SWITCH,PUSH 1P-1T, POWER, VHR-459EE ONLY
OR	645 001 9777	SWITCH,PUSH 1P-1T, POWER, VHR-459EE ONLY
S7007	645 008 8049	SWITCH,PUSH 1P-1T, PAUSE,VHR-459EE ONLY
OR	645 006 2797	SWITCH,PUSH 1P-1T, PAUSE,VHR-459EE ONLY
OR	645 001 9777	SWITCH,PUSH 1P-1T, PAUSE,VHR-459EE ONLY
S7008	645 008 8049	SWITCH,PUSH 1P-1T, PLAY,VHR-459EE ONLY
OR	645 006 2797	SWITCH,PUSH 1P-1T, PLAY,VHR-459EE ONLY
OR	645 001 9777	SWITCH,PUSH 1P-1T, PLAY,VHR-459EE ONLY
S7010	645 008 8049	SWITCH,PUSH 1P-1T, STOP/EJECT, VHR-459EE ONLY
OR	645 006 2797	SWITCH,PUSH 1P-1T, STOP/EJECT, VHR-459EE ONLY
OR	645 001 9777	SWITCH,PUSH 1P-1T, STOP/EJECT, VHR-459EE ONLY
S8001	645 029 7076	SWITCH,MODE 1P-1T VC, SWITCH MODE
S8002	645 029 7069	SWITCH,DETECTOR 1P-1T VC, SWITCH EP
	(REMOTE RECEIVERS)	
RR701	645 027 5654	UNIT,IR RECEIVER PACK
	(DISPLAYS)	
A7001	645 031 0096	FLUORESCENT TUBE
OR	645 031 0089	FLUORESCENT TUBE
	(FUSES)	
F5001	⚠ 423 021 8402	FUSE 250V 2.5A
OR	⚠ 423 022 6506	FUSE 250V 2.5A
OR	⚠ 423 025 9900	FUSE 250V 2.5A
	(PROTECTORS)	
PR511	⚠ 645 005 9834	PROTECTOR,IC 1.0A 50V
PR512	⚠ 645 014 2550	PROTECTOR,2A 125V
PR513	⚠ 645 014 2529	PROTECTOR,1.25A 125V
	(MISCELLANEOUS)	
	613 053 8048	FIXER
	645 008 7677	HOLDER,FUSE,F5001
OR	645 008 7660	HOLDER,FUSE,F5001
OR	645 016 0479	HOLDER,FUSE,F5001
	613 183 5337	HOLDER FL
OR	613 164 2447	HOLDER FL
	613 183 7553	HOLDER LED, PSLED,VHR-459EE ONLY
	613 182 3334	HOLDER,LED VC
	613 182 3341	HOLDER,END SENSOR VC

COMPL PWB,TM-1

LOCATION	PARTS NO.	DESCRIPTION
	613 184 1277	VHR-489SP ONLY
	613 184 4827	VHR-459EV ONLY
	(CONNECTORS)	
CN711	645 009 4118	SOCKET,FFC 7P (N.S.P),EXCEPT VHR-459EE
CN711	645 011 3857	SOCKET,FFC 7P (N.S.P),EXCEPT VHR-459EE
	(SWITCHES)	
S7101	613 093 8596	SW,PUSH, REC,EXCEPT VHR-459EE
OR	645 005 1302	SWITCH,PUSH 1P-1T, REC,EXCEPT VHR-459EE
S7102	613 093 8596	SW,PUSH, FF,EXCEPT VHR-459EE
OR	645 005 1302	SWITCH,PUSH 1P-1T, FF,EXCEPT VHR-459EE
S7103	613 093 8596	SW,PUSH, REW,EXCEPT VHR-459EE
OR	645 005 1302	SWITCH,PUSH 1P-1T, REW,EXCEPT VHR-459EE
S7104	613 093 8596	SW,PUSH, PAUSE,EXCEPT VHR-459EE
OR	645 005 1302	SWITCH,PUSH 1P-1T, PAUSE, EXCEPT VHR-459EE
S7105	613 093 8596	SW,PUSH, PLAY,EXCEPT VHR-459EE
OR	645 005 1302	SWITCH,PUSH 1P-1T, PLAY, EXCEPT VHR-459EE
S7106	613 093 8596	SW,PUSH, STOP/EJECT,EXCEPT VHR-459EE
OR	645 005 1302	SWITCH,PUSH 1P-1T, STOP/EJECT, EXCEPT VHR-459EE
S7107	645 008 8049	SWITCH,PUSH 1P-1T, REC LIST DELUX, EXCEPT VHR-459EE
OR	645 006 2797	SWITCH,PUSH 1P-1T, REC LIST DELUX, EXCEPT VHR-459EE
S7107	645 001 9777	SWITCH,PUSH 1P-1T, REC LIST DELUX, EXCEPT VHR-459EE

COMPL PWB,TM-2

LOCATION	PARTS NO.	DESCRIPTION
	613 184 1215	VHR-489SP ONLY
	613 184 4797	VHR-459EV ONLY
	(CONNECTORS)	
CN722	645 003 1755	SOCKET,RIBBON 4P (N.S.P), EXCEPT VHR-459EE
	(DIODES)	
D7201	408 039 4509	LED SLZ-381B-09H-AB-T1, POWER LED, EXCEPT VHR-459EE
OR	408 040 4000	LED SEL2415EMTP6-C, POWER LED, EXCEPT VHR-459EE
OR	408 040 4109	LED SEL2415EMTP6-D, POWER LED, EXCEPT VHR-459EE
	(RESISTORS)	
R7204	401 014 2804	CARBON 150 JA 1/4W, EXCEPT VHR-459EE
	(SWITCHES)	
S7201	613 093 8596	SW,PUSH, POWER,EXCEPT VHR-459EE
OR	645 005 1302	SWITCH,PUSH 1P-1T, POWER, EXCEPT VHR-459EE
OR	613 006 3700	PUSH SWITCH, POWER,EXCEPT VHR-459EE
OR	613 079 4178	SW,PUSH, POWER,EXCEPT VHR-459EE

COMPL PWB,TB-1

LOCATION	PARTS NO.	DESCRIPTION
	613 184 0867	EXCEPT VHR-489SP
	613 184 6463	VHR-489SP ONLY
	(CONNECTORS)	
CN851	645 003 0925	PLUG,11P (N.S.P),VHR-489SP ONLY
CN851	645 013 4548	PLUG,6P (N.S.P),EXCEPT VHR-489SP
CN861	645 003 0918	PLUG,9P (N.S.P),EXCEPT VHR-489SP
CN861	645 003 0932	PLUG,13P (N.S.P),VHR-489SP ONLY
CN871	645 018 7605	SOCKET,RGB 21P
OR	645 021 1096	SOCKET,RGB 21P
CN872	645 020 9475	SOCKET,RGB 21P,VHR-489SP ONLY
OR	645 021 1102	SOCKET,RGB 21P,VHR-489SP ONLY
	(SEMICONDUCTORS)	
Q8604	405 029 3504	TR DTC144EK,VHR-489SP ONLY
Q8605	405 002 0308	TR 2SA1037K-R,VHR-489SP ONLY
OR	405 002 0407	TR 2SA1037K-S,VHR-489SP ONLY
	(INTEGRATED CIRCUITS)	
IC861	409 432 5001	IC LA7148M-MPB,VHR-489SP ONLY
	(DIODES)	
D8604	407 012 4406	DIODE 1SS133,VHR-489SP ONLY
D8605	407 012 4406	DIODE 1SS133,VHR-489SP ONLY
D8606	407 012 4406	DIODE 1SS133,VHR-489SP ONLY
D8607	407 012 4406	DIODE 1SS133,VHR-489SP ONLY
D8608	407 063 8804	ZENER DIODE MTZJ5.6A,VHR-489SP ONLY
D8609	407 063 8804	ZENER DIODE MTZJ5.6A,VHR-489SP ONLY
D8610	407 063 8804	ZENER DIODE MTZJ5.6A,VHR-489SP ONLY
D8611	407 063 8804	ZENER DIODE MTZJ5.6A,VHR-489SP ONLY
D8612	407 099 7000	ZENER DIODE MTZJ15B,VHR-489SP ONLY
D8613	407 099 7000	ZENER DIODE MTZJ15B
	(INDUCTORS)	
L8502	645 025 0644	INDUCTOR,0.75UH
L8503	645 025 0644	INDUCTOR,0.75UH,VHR-489SP ONLY
	(CAPACITORS)	
C8504	403 010 1102	CERAMIC 1000P J 50V
C8508	403 010 1102	CERAMIC 1000P J 50V
C8513	403 010 1102	CERAMIC 1000P J 50V,VHR-489SP ONLY
C8531	403 010 1102	CERAMIC 1000P J 50V,VHR-489SP ONLY
C8572	403 189 2405	ELECT 10U M 16V,VHR-489SP ONLY
C8574	403 189 2405	ELECT 10U M 16V,VHR-489SP ONLY
C8577	403 163 8409	ELECT 47U M 16V,VHR-489SP ONLY
C8578	403 189 2405	ELECT 10U M 16V,VHR-489SP ONLY
C8579	403 191 8709	ELECT 1U M 50V,VHR-489SP ONLY
C8580	403 191 8709	ELECT 1U M 50V,VHR-489SP ONLY
C8581	403 191 8709	ELECT 1U M 50V,VHR-489SP ONLY
C8582	403 191 8709	ELECT 1U M 50V,VHR-489SP ONLY
C8601	403 191 8709	ELECT 1U M 50V,VHR-489SP ONLY
C8602	403 191 8709	ELECT 1U M 50V,VHR-489SP ONLY

LOCATION	PARTS NO.	DESCRIPTION
C8603	403 026 2803	CERAMIC 47P J 50V,VHR-489SP ONLY
C8605	403 068 0409	CERAMIC 0.1U Z 25V,VHR-489SP ONLY
C8606	403 163 8409	ELECT 47U M 16V,VHR-489SP ONLY
C8607	403 068 0409	CERAMIC 0.1U Z 25V,VHR-489SP ONLY
C8609	403 135 4101	ELECT 470U M 6.3V,VHR-489SP ONLY
C8610	403 086 2805	NP-ELECT 1U M 50V,VHR-489SP ONLY
C8611	403 191 8709	ELECT 1U M 50V,VHR-489SP ONLY
C8613	403 026 2209	CERAMIC 47P J 50V,VHR-489SP ONLY
C8614	403 026 2209	CERAMIC 47P J 50V,VHR-489SP ONLY
C8615	403 163 7907	ELECT 47U M 6.3V,VHR-489SP ONLY
	(RESISTORS)	
R8502	401 038 2101	MT-GLAZE 2.7K JA 1/10W
R8504	401 038 7601	MT-GLAZE 560 JA 1/10W
R8505	401 038 0909	MT-GLAZE 220K JA 1/10W,VHR-489SP ONLY
R8508	401 038 2101	MT-GLAZE 2.7K JA 1/10W,VHR-489SP ONLY
R8522	401 038 2101	MT-GLAZE 2.7K JA 1/10W
R8528	401 038 2101	MT-GLAZE 2.7K JA 1/10W,VHR-489SP ONLY
R8529	401 038 7601	MT-GLAZE 560 JA 1/10W,VHR-489SP ONLY
R8592	401 037 5004	MT-GLAZE 0.000 ZA 1/10W,EXCEPT VHR-489SP
R8592	401 038 0602	MT-GLAZE 220 JA 1/10W,VHR-489SP ONLY
R8601	401 038 9506	MT-GLAZE 75 JA 1/10W
R8602	401 038 9506	MT-GLAZE 75 JA 1/10W,VHR-489SP ONLY
R8609	401 036 9506	MT-GLAZE 75 JA 1/10W,VHR-489SP ONLY
R8611	401 018 2701	CARBON 330 JA 1/4W,VHR-489SP ONLY
R8612	401 014 2804	CARBON 150 JA 1/4W,VHR-489SP ONLY
R8613	401 014 2804	CARBON 150 JA 1/4W,VHR-489SP ONLY
R8614	401 037 5202	MT-GLAZE 100 JA 1/10W,VHR-489SP ONLY
R8615	401 037 5202	MT-GLAZE 100 JA 1/10W,VHR-489SP ONLY
R8620	401 037 9309	MT-GLAZE 18K JA 1/10W,VHR-489SP ONLY
R8621	401 038 6406	MT-GLAZE 4.7K JA 1/10W,VHR-489SP ONLY
R8624	401 038 0701	MT-GLAZE 2.2K JA 1/10W,VHR-489SP ONLY
R8625	401 038 6406	MT-GLAZE 4.7K JA 1/10W,VHR-489SP ONLY
R8626	401 037 5004	MT-GLAZE 0.000 ZA 1/10W,VHR-489SP ONLY
R8630	401 037 6803	MT-GLAZE 12K JA 1/10W,VHR-489SP ONLY
R8631	401 039 0403	MT-GLAZE 8.2K JA 1/10W,VHR-489SP ONLY
	(JUMPERS)	
	401 037 5004	MT-GLAZE 0.000 ZA 1/10W

FLEXIBLE FLAT CABLE

	645 031 6081	FLEXIBLE FLAT CABLE, CP-1(CN351)-STATOR CYL(CN1)
	645 032 2129	FLEXIBLE FLAT CABLE, CN701-CN711,EXCEPT VHR-459EE

ACCESSORIES

	613 179 2586	COVER BATTERY,FOR REMOCON,INFRARED, VHR-489SP ONLY
	613 179 2531	COVER BATTERY,FOR REMOCON,INFRARED, EXCEPT VHR-489SP
	645 032 7377	REMOCON,INFRARED,WITH COVER BATTERY, VHR-489SP ONLY
	645 033 1855	REMOCON,INFRARED,WITH COVER BATTERY, VHR-459EE ONLY
	645 035 8227	REMOCON,INFRARED,WITH COVER BATTERY, VHR-459EV ONLY
	613 184 6357	INSTRUCTION MANUAL,VHR-489SP ONLY
	613 185 1160	INSTRUCTION MANUAL,VHR-459EE ONLY
	613 185 1177	INSTRUCTION MANUAL,VHR-459EV ONLY
	645 023 4170	CABLE,ANT PAL
OR	645 025 1382	CABLE,ANT PAL
	⚠ 645 023 4163	CORD,POWER-1.5MK,EXCEPT VHR-459EE
OR	⚠ 645 024 0522	CORD,POWER-1.5MK,EXCEPT VHR-459EE
OR	⚠ 645 028 3086	CORD,POWER-1.525MK,EXCEPT VHR-459EE
OR	⚠ 645 025 0767	CORD,POWER-1.5MK,EXCEPT VHR-459EE
	⚠ 645 024 0522	CORD,POWER-1.5MK,VHR-459EE ONLY
OR	⚠ 645 025 0767	CORD,POWER-1.5MK,VHR-459EE ONLY
OR	⚠ 645 028 3086	CORD,POWER-1.525MK,VHR-459EE ONLY
OR	⚠ 645 019 2647	CORD,POWER-1.807MK,VHR-459EE ONLY
OR	⚠ 645 009 0400	CORD,POWER-1.875MK,VHR-459EE ONLY

PACKING MATERIALS

LOCATION	PARTS NO.	DESCRIPTION
	613 184 6661	CARTON CASE,VHR-489SP ONLY
	613 185 1542	CARTON CASE,VHR-459EE ONLY
	613 185 1627	CARTON CASE,VHR-459EV ONLY
	613 183 5856	CUSHION, FRONT(SID),EXCEPT VHR-459EE
	613 179 3811	CUSHION, FRONT(SJC),VHR-459EE ONLY
	613 183 5863	CUSHION, BACK(SID),EXCEPT VHR-459EE
	613 179 3828	CUSHION, BACK(SJC),VHR-459EE ONLY
	645 032 7780	POLY SHEET-0860X0500*NC,VHR-459EE ONLY
	613 139 8047	POLYE COVER,INNER-K,EXCEPT VHR-459EE

SANYO Electric Co.,Ltd.
Osaka, Japan

Apr./'99/3700 NS Printed in Japan

VHR-459EE
VHR-459EV
VHR-489SP

BLOCK DIAGRAMS,CIRCUIT DIAGRAMS & PRINTED WIRING BOARDS

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1. OVERALL WIRING & BLOCK DIAGRAMS

2. CIRCUIT DIAGRAMS & PRINTED WIRING BOARDS (P.W.B.)

SE4N/EE2,SE4/EV2,SP 94N

REFERENCE No.SM5310020

NOTES:

1. All resistance values in "OHMS" unless otherwise noted.
   (K=1,000 ; M=1,000,000)
2. All capacitance values in "μF" unless otherwise noted.
   p=pico farad ; μ ,u or U=micro farad
3. All inductance values in "μH" unless otherwise noted.
   μ ,u or U=micro henry ; m=milli henry

PRODUCTSAFETYNOTICE

THE COMPONENTS DESIGNATED BY A SYMBOL (⚠) IN THIS SCHEMATIC DIAGRAM DESIGNATES COMPONENTS WHOSE VALUEAREOFSPECIALSIGNIFICANCETOPRODUCTSAFETY. SHOULDANYCOMPONENTDESIGNATEDBYASYMBOLNEEDTO BEREPLACED,USEONLYTHEPARTDESIGNATEDINTHEPARTS LIST.

DONOTDEVIATEFROMTHERESISTANCE,WATTAGEANDVOLT-AGERATINGSSHOWN.

EXPLANATORY NOTES (EXAMPLES)

Resistor 10K:1/16J means 10kilo ohm ±5%, 1/16watt max.
1M:1/10K means 1mega ohm ±10%, 1/10watt max.

Capacitor 0.047:F means 0.047micro farad, Ftype.

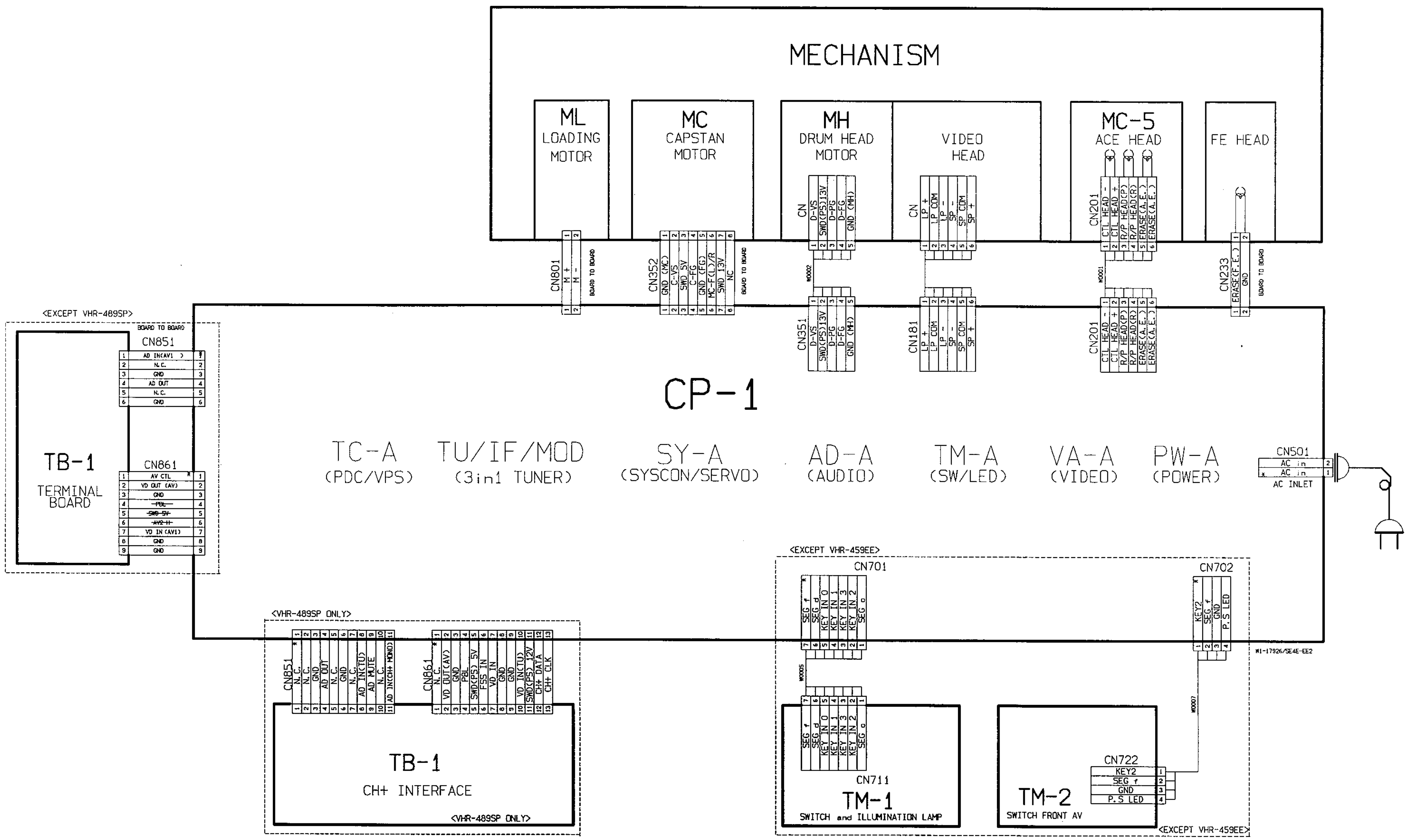
Electrolytic capacitor
10:16 means 10micro farad, 16volt max.

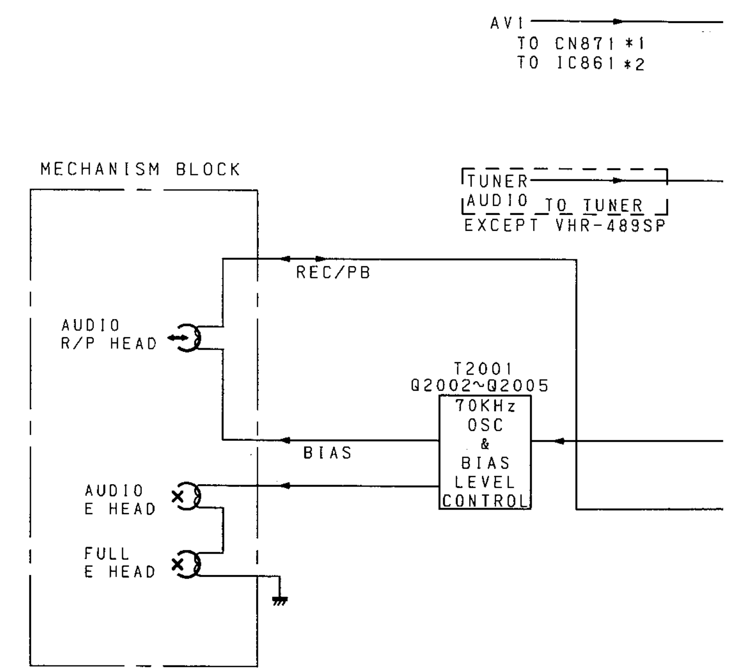
Inductor 330:J means 330micro henry ±5%
470:K means 470micro henry ±10%
No description J or K means ±5%

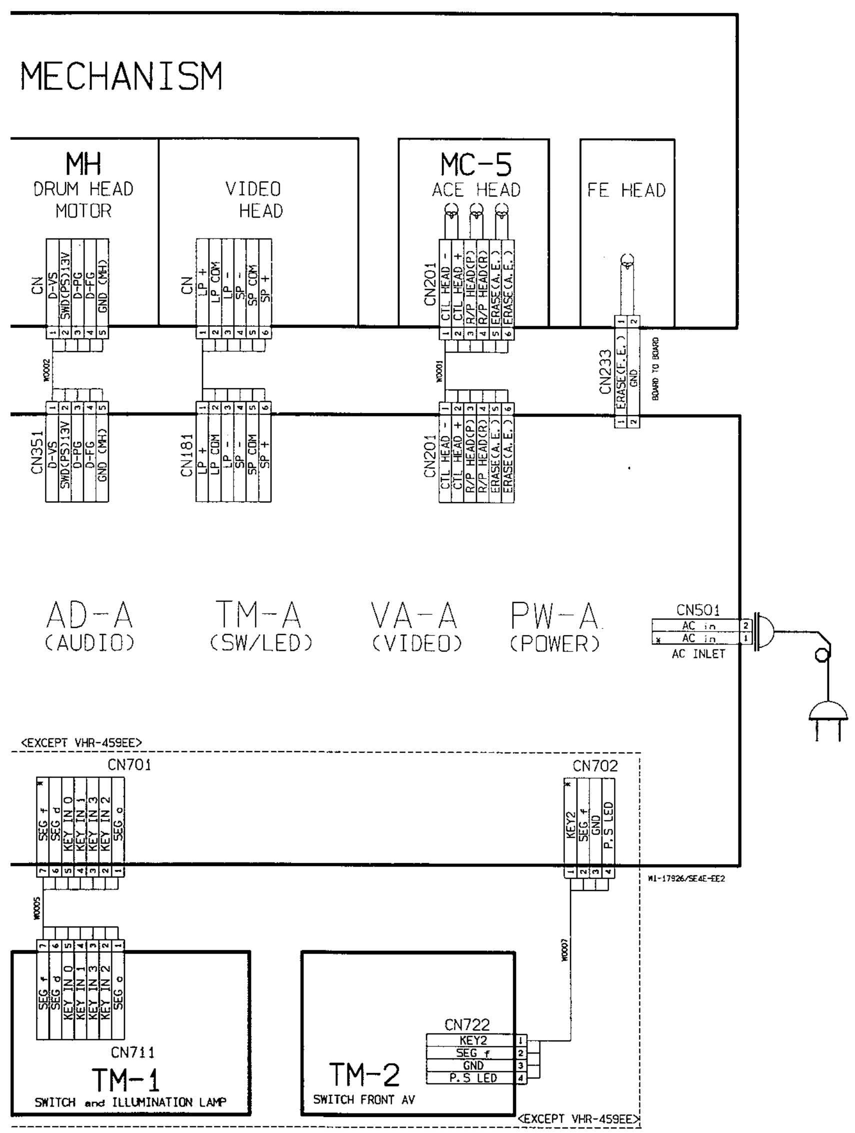
PAL-C-EX

1. OVERALL WIRING & BLOCK DIAGRAMS

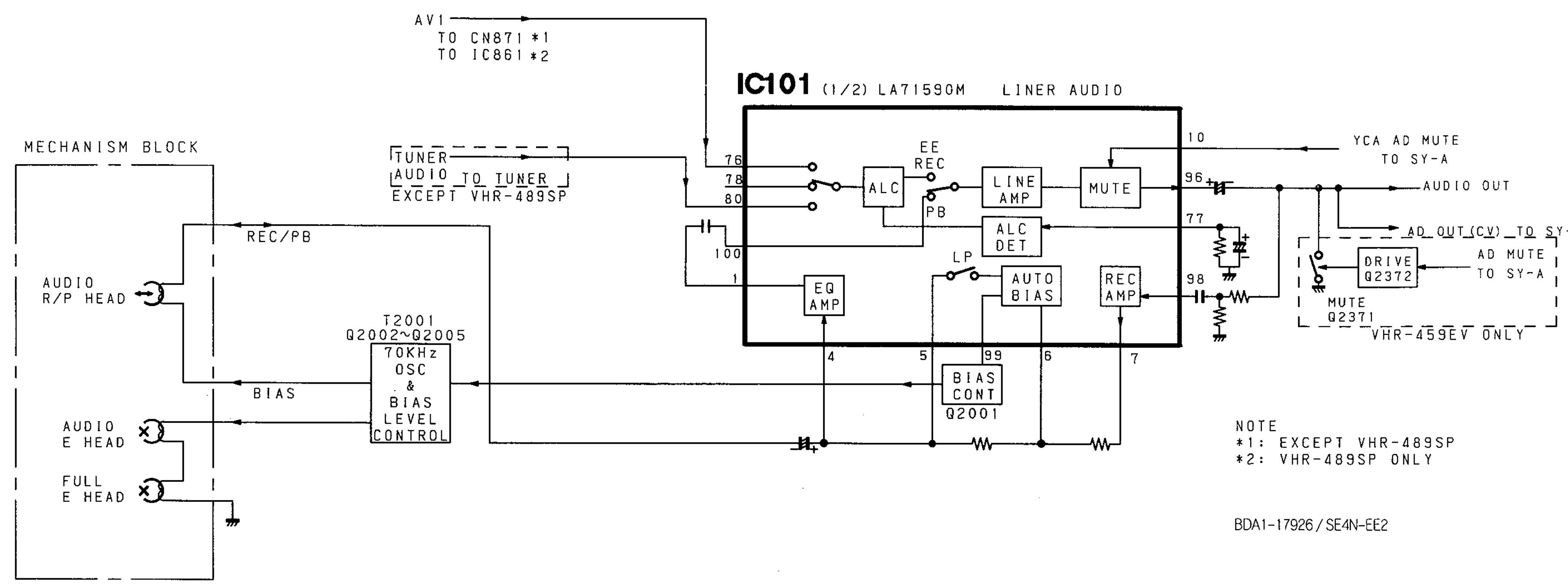
OVERALL WIRING



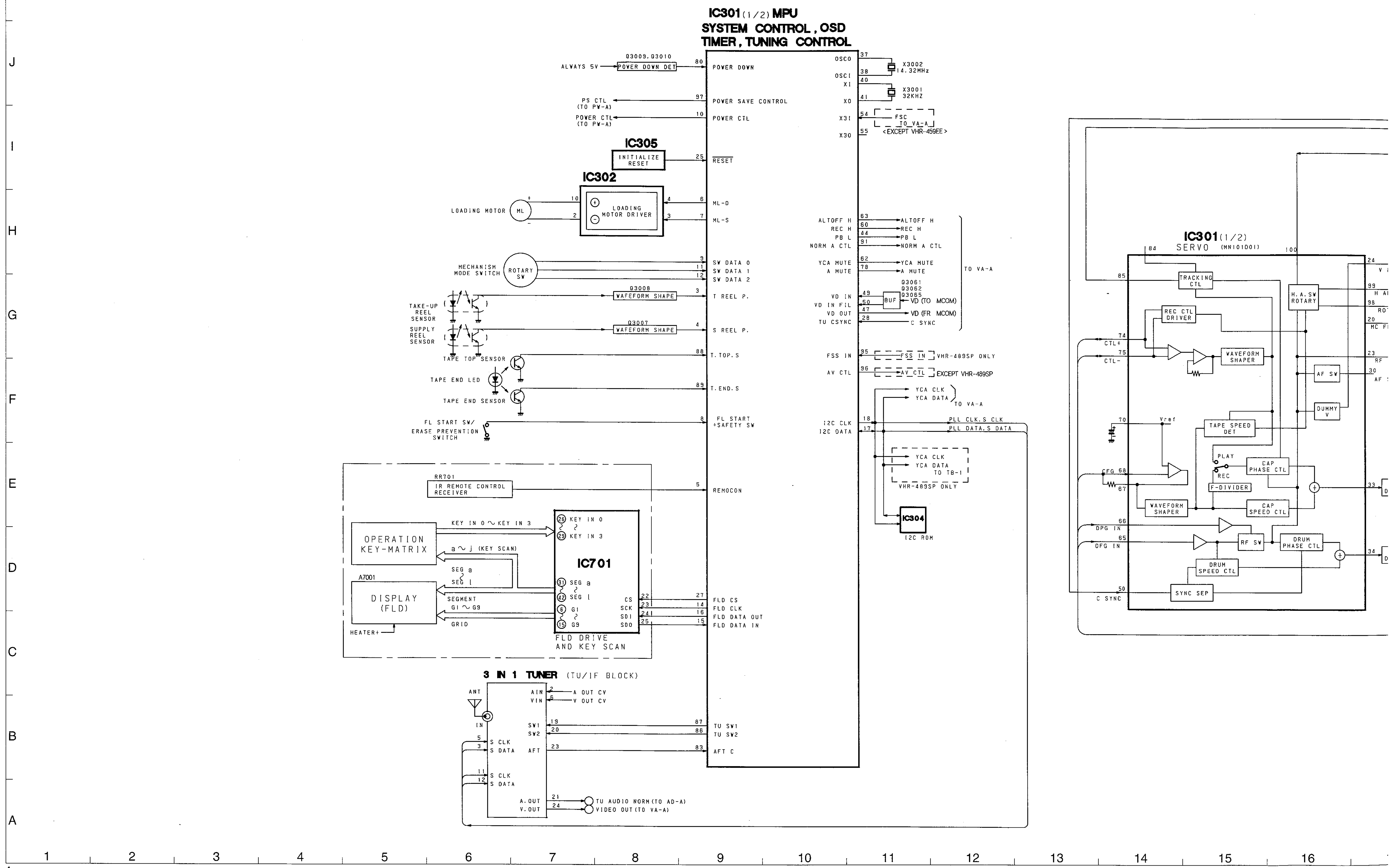




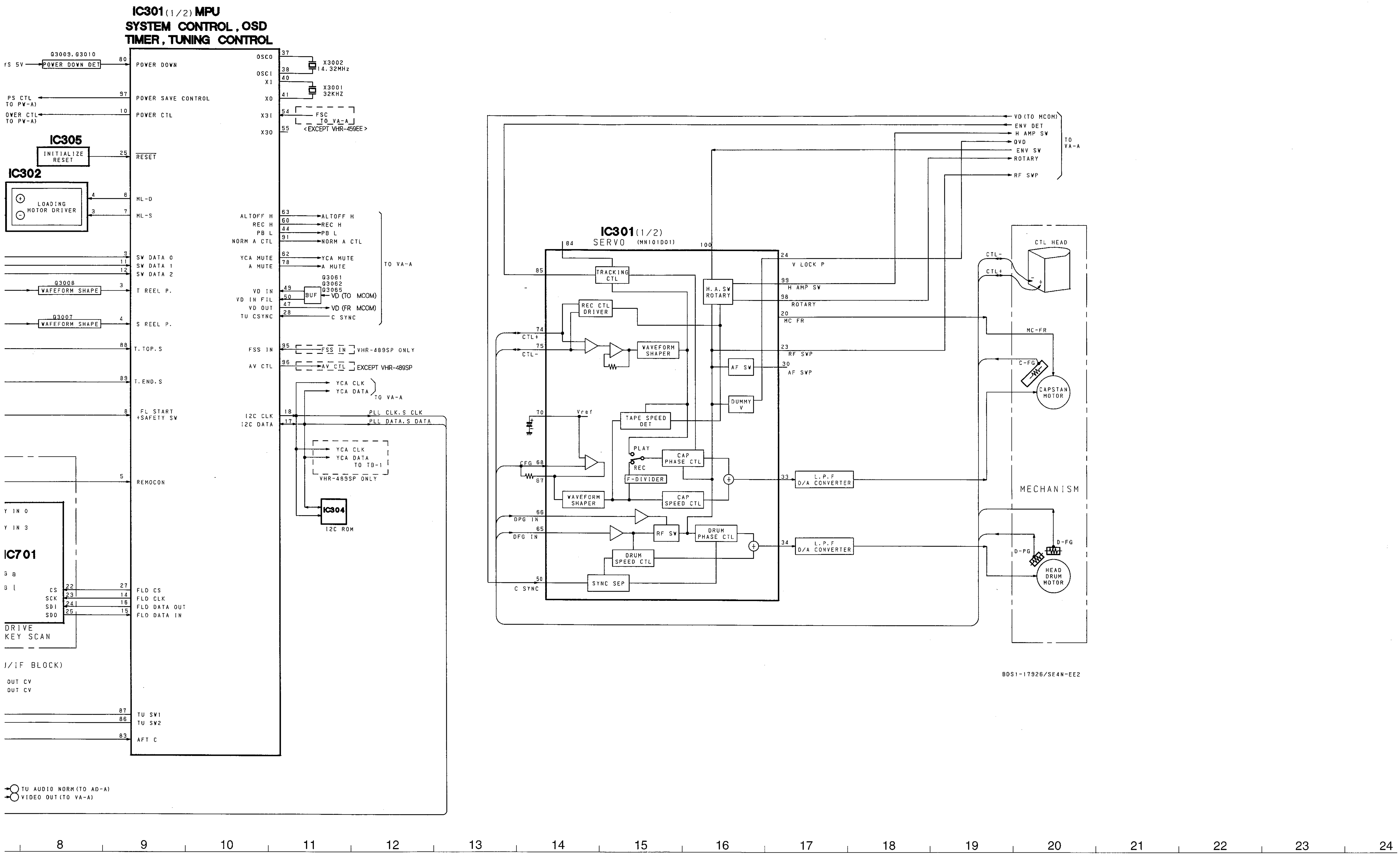
AUDIO CIRCUIT



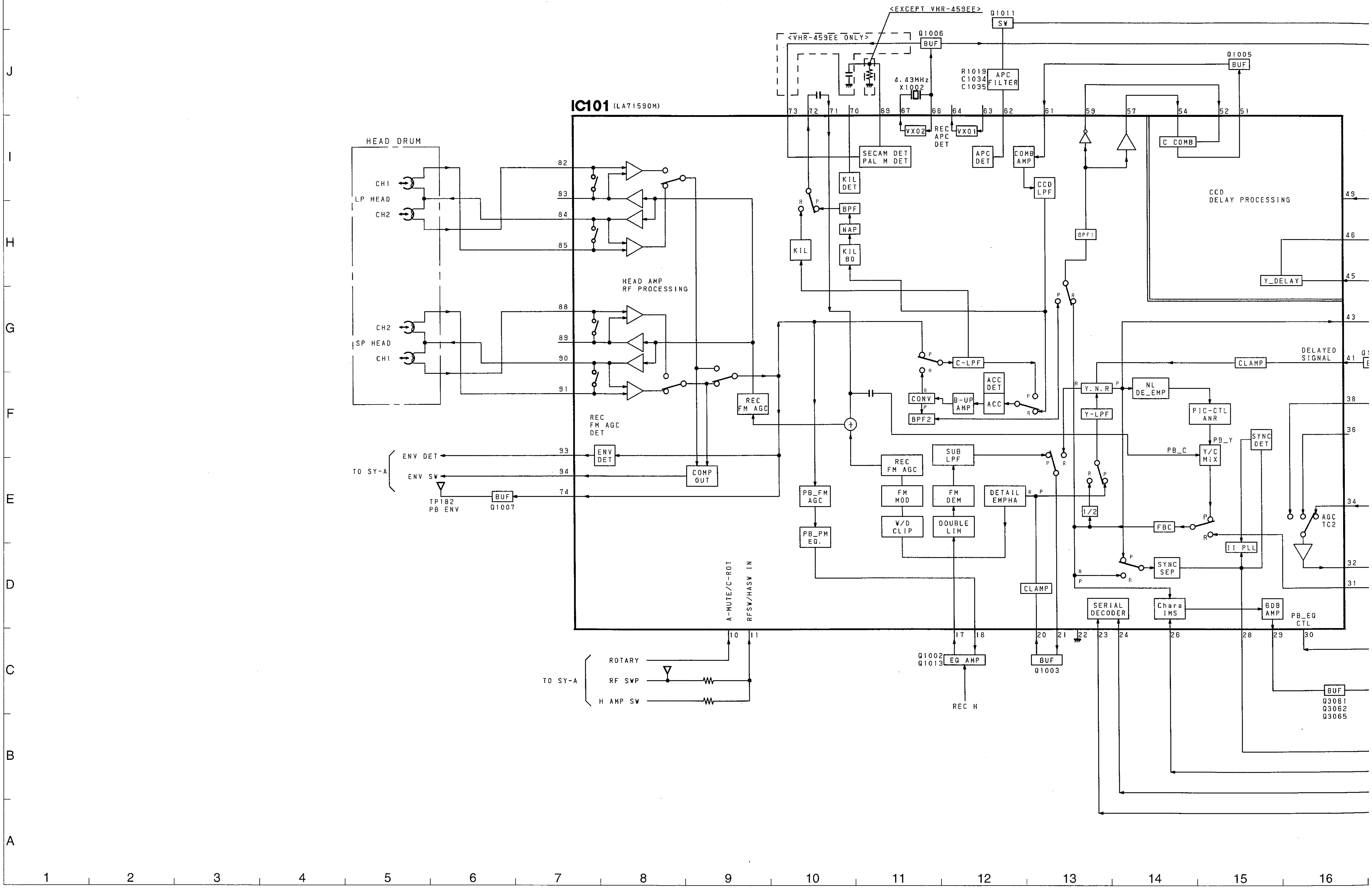
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23


IC301 (1/2) MPU
SYSTEM CONTROL, OSD
TIMER, TUNING CONTROL
ALWAYS 5V
Q3009, Q3010
POWER DOWN DET
POWER DOWN
PS CTL (TO PW-A)
POWER CTL (TO PW-A)
POWER SAVE CONTROL
POWER CTL
IC305
INITIALIZE RESET
RESET
IC302
LOADING MOTOR DRIVER
LOADING MOTOR
ML-D
ML-S
MECHANISM MODE SWITCH
ROTARY SW
SW DATA 0
SW DATA 1
SW DATA 2
TAKE-UP REEL SENSOR
Q3008
WAVEFORM SHAPE
T REEL P.
SUPPLY REEL SENSOR
Q3007
WAVEFORM SHAPE
S REEL P.
TAPE TOP SENSOR
T.TOP.S
TAPE END LED
TAPE END SENSOR
T.END.S
FL START SW/ ERASE PREVENTION SWITCH
FL START +SAFETY SW
RR701
IR REMOTE CONTROL RECEIVER
REMOCON
OPERATION KEY-MATRIX
KEY IN 0 ~ KEY IN 3
a ~ j (KEY SCAN)
A7001
DISPLAY (FLD)
SEG a
SEG l
SEGMENT G1 ~ G9
GRID
HEATER+
IC701
FLD DRIVE AND KEY SCAN
FLD CS
FLD CLK
FLD DATA OUT
FLD DATA IN
3 IN 1 TUNER (TU/IF BLOCK)
ANT
A OUT CV
V OUT CV
S CLK
S DATA
AFT
TU SW1
TU SW2
AFT C
TU AUDIO NORM (TO AD-A)
VIDEO OUT (TO VA-A)
OSCO
OSCI
XI
XO
X3002 14.32MHz
X3001 32KHZ
FSC TO VA-A
<EXCEPT VHR-459EE>
ALTOFF H
REC H
PB L
NORM A CTL
YCA MUTE
A MUTE
TO VA-A
Q3061 Q3062 Q3065
BUF
VD (TO MCOM)
VD (FR MCOM)
C SYNC
VD IN
VD IN FIL
VD OUT
TU CSYNC
FSS IN
VHR-489SP ONLY
AV CTL
EXCEPT VHR-489SP
YCA CLK
YCA DATA
I2C CLK
I2C DATA
PLL CLK.S CLK
PLL DATA.S DATA
TO TB-1
IC304
I2C ROM
IC301 (1/2)
SERVO (MN101D01)
TRACKING CTL
REC CTL DRIVER
H.A.SW ROTARY
WAVEFORM SHAPER
AF SW
DUMMY V
TAPE SPEED DET
CAP PHASE CTL
CAP SPEED CTL
F-DIVIDER
RF SW
DRUM PHASE CTL
DRUM SPEED CTL
SYNC SEP
CTL+
CTL-
CFG
DPG IN
DFG IN
C SYNC
Vref
PLAY
REC

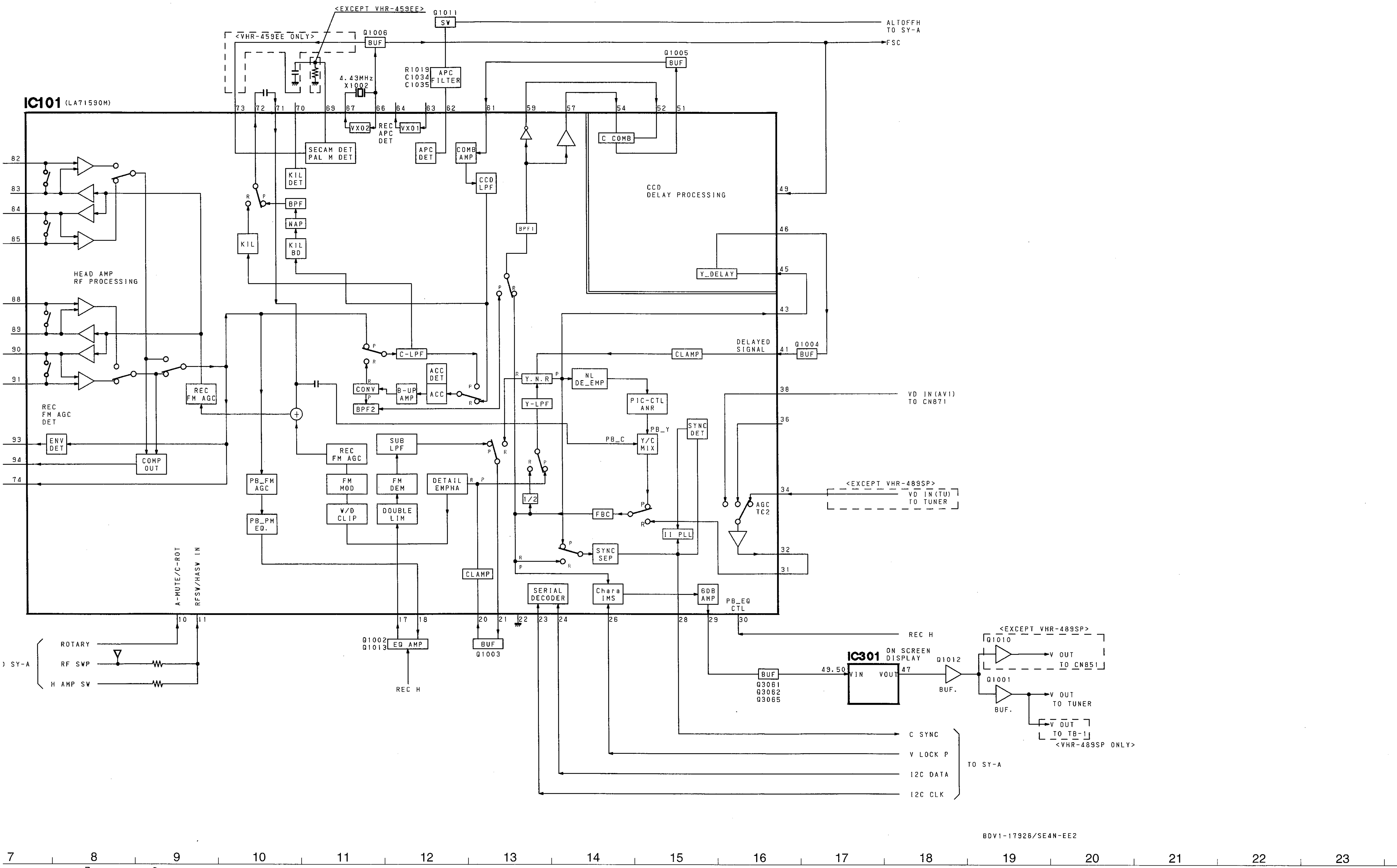
SYSTEM CONTROL & SERVO CIRCUIT



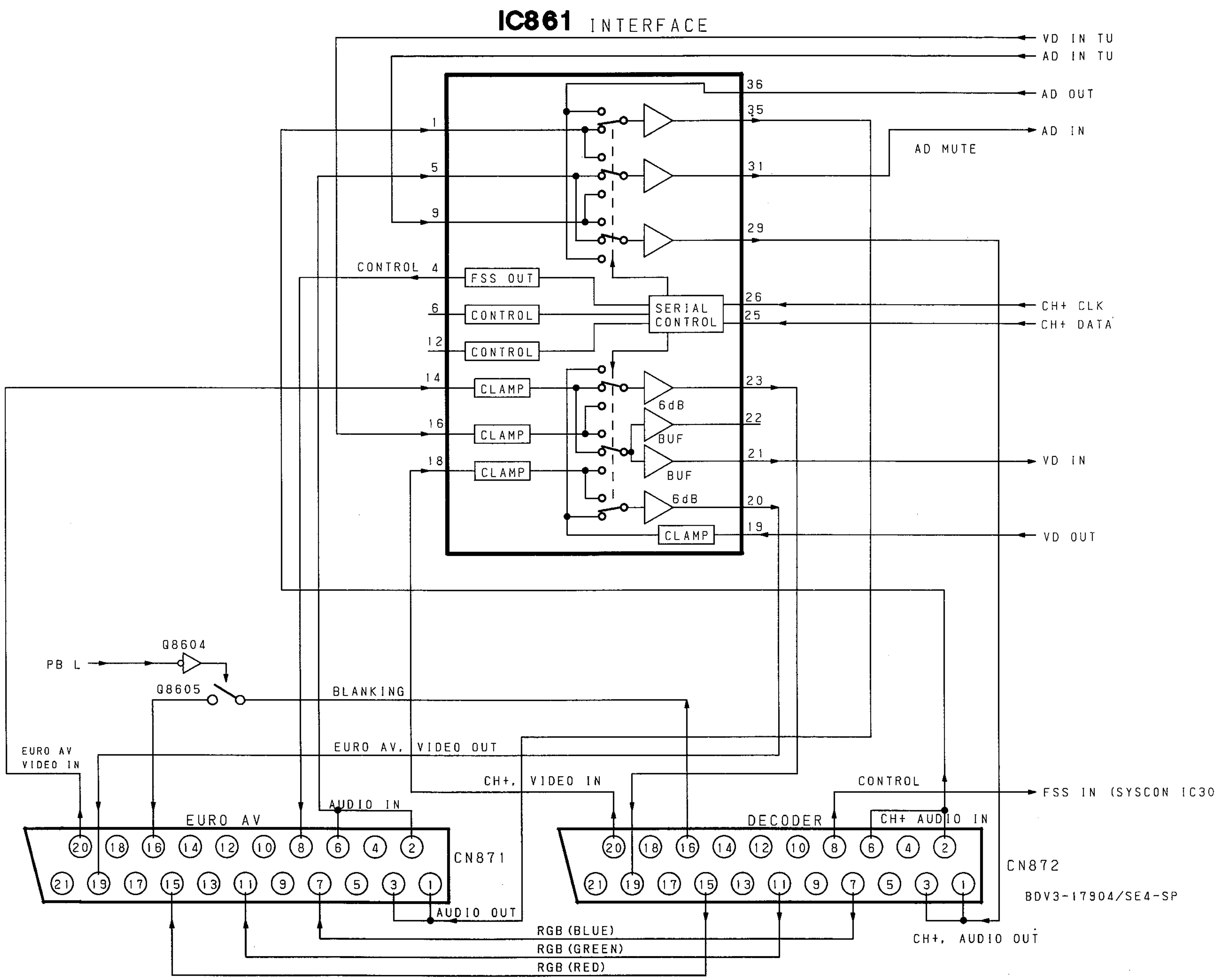
VIDEO CIRCUIT



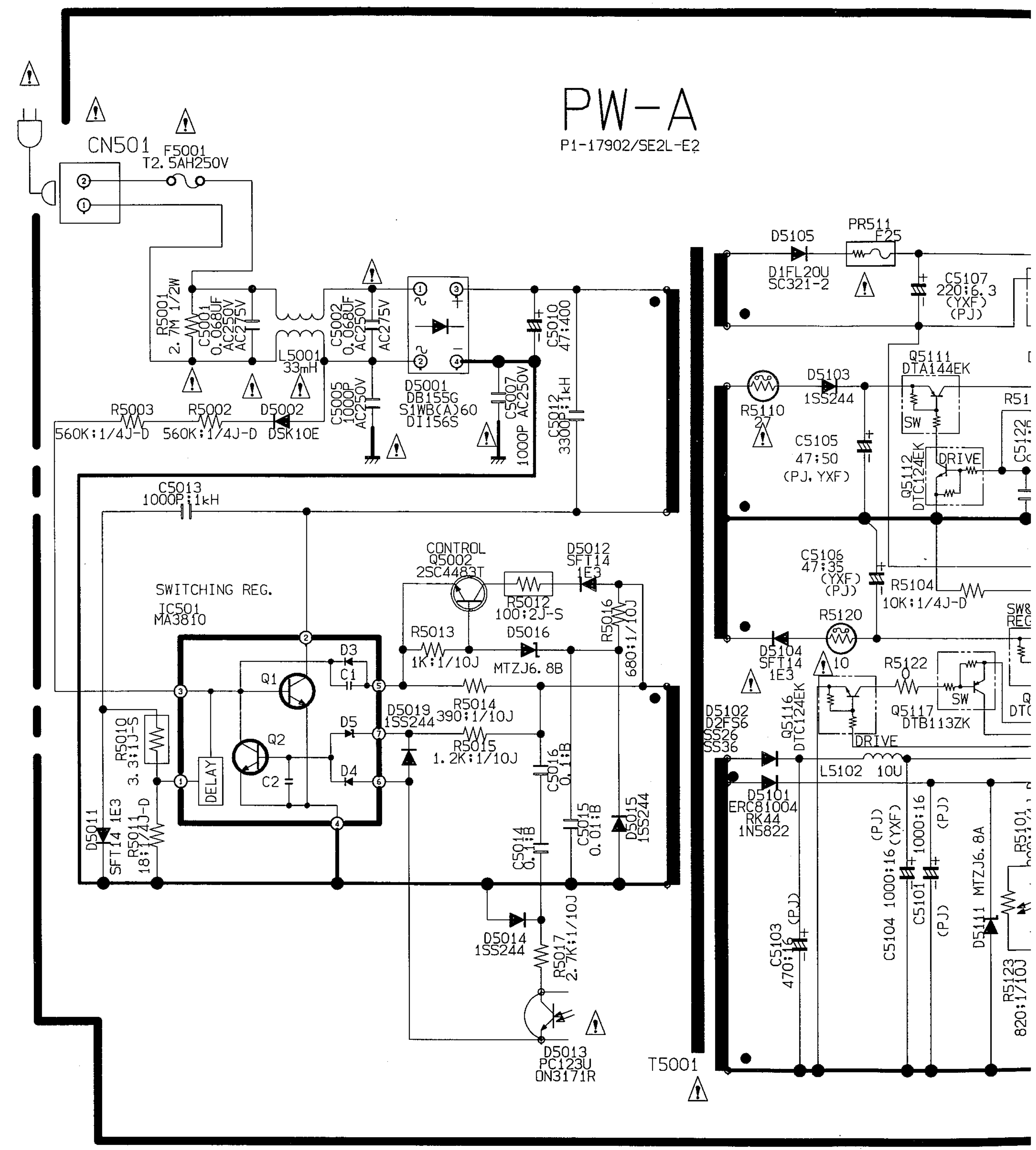
VIDEO CIRCUIT



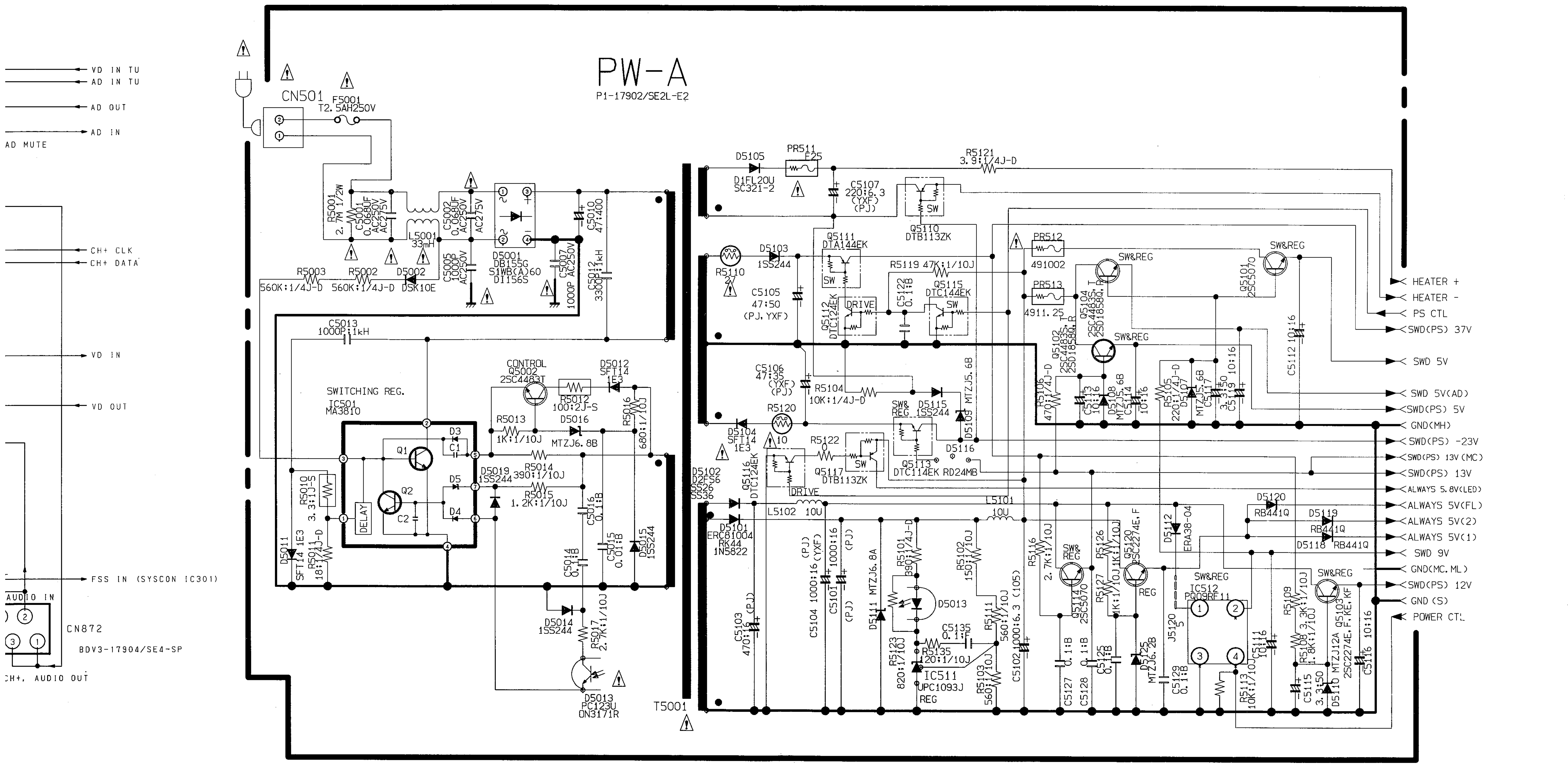
DECODER INTERFACE CIRCUIT (VHR-489SP ONLY)

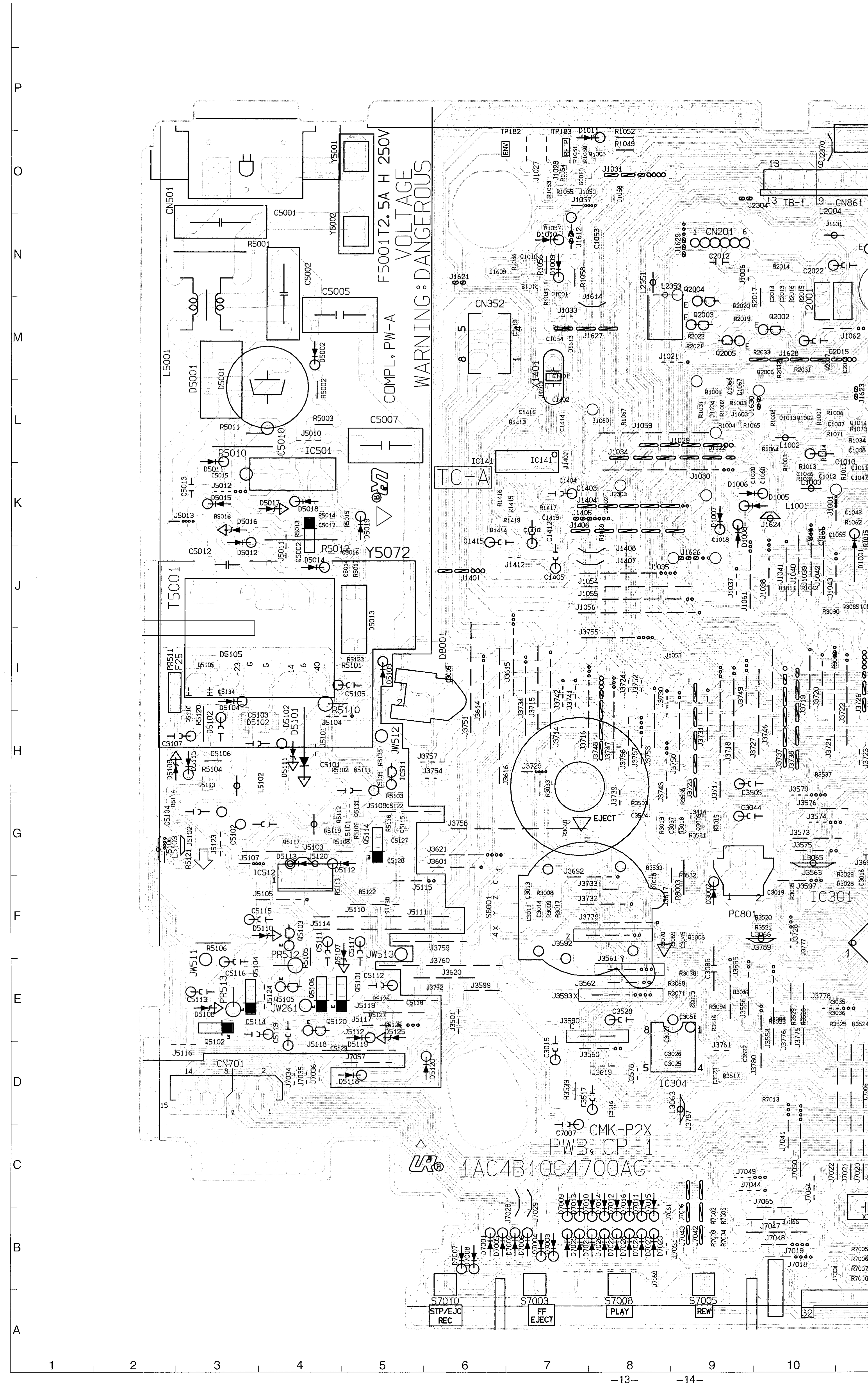


CP-1 BOARD (PW-A) POWER

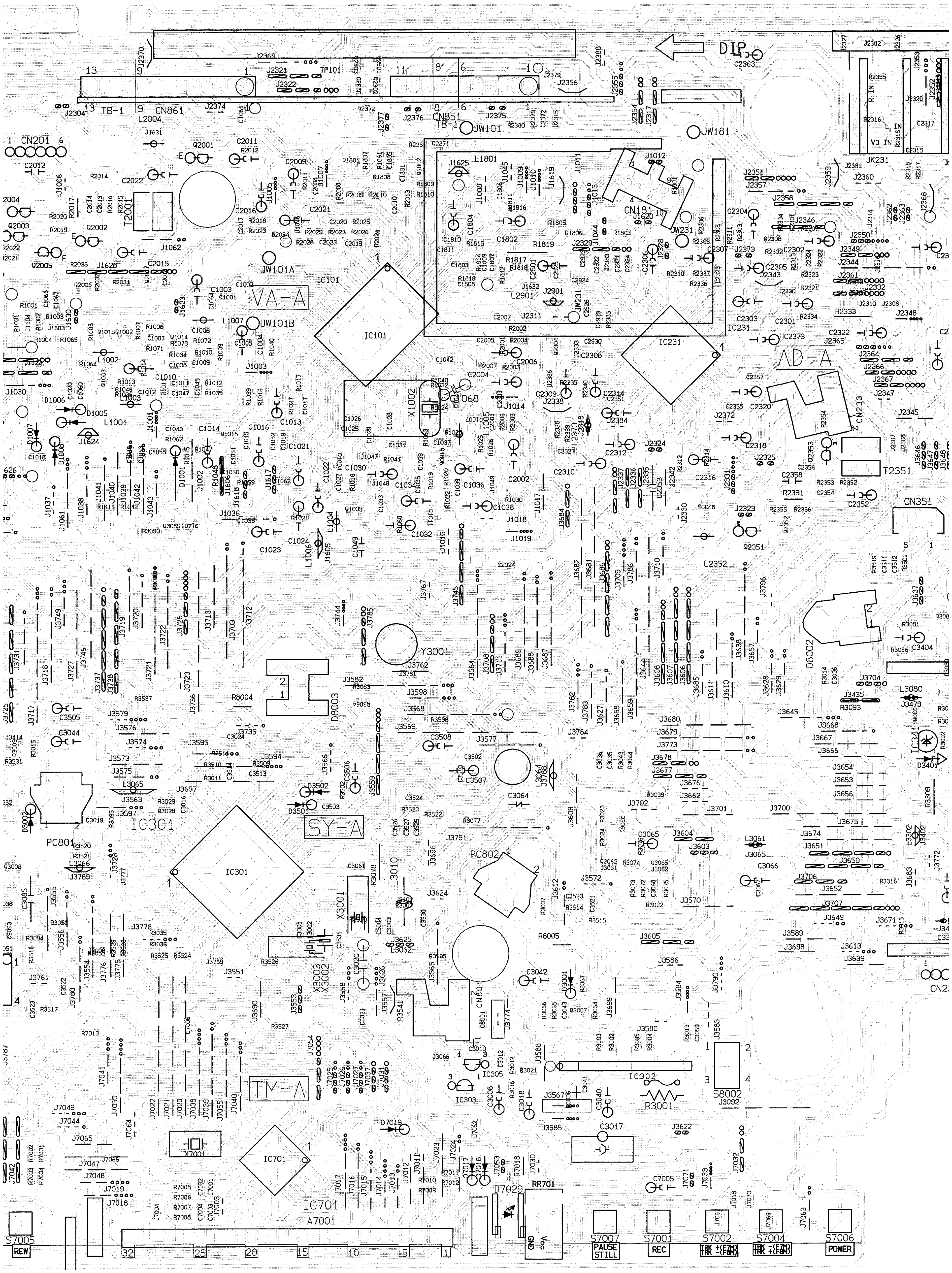


CP-1 BOARD (PW-A) POWER SUPPLY

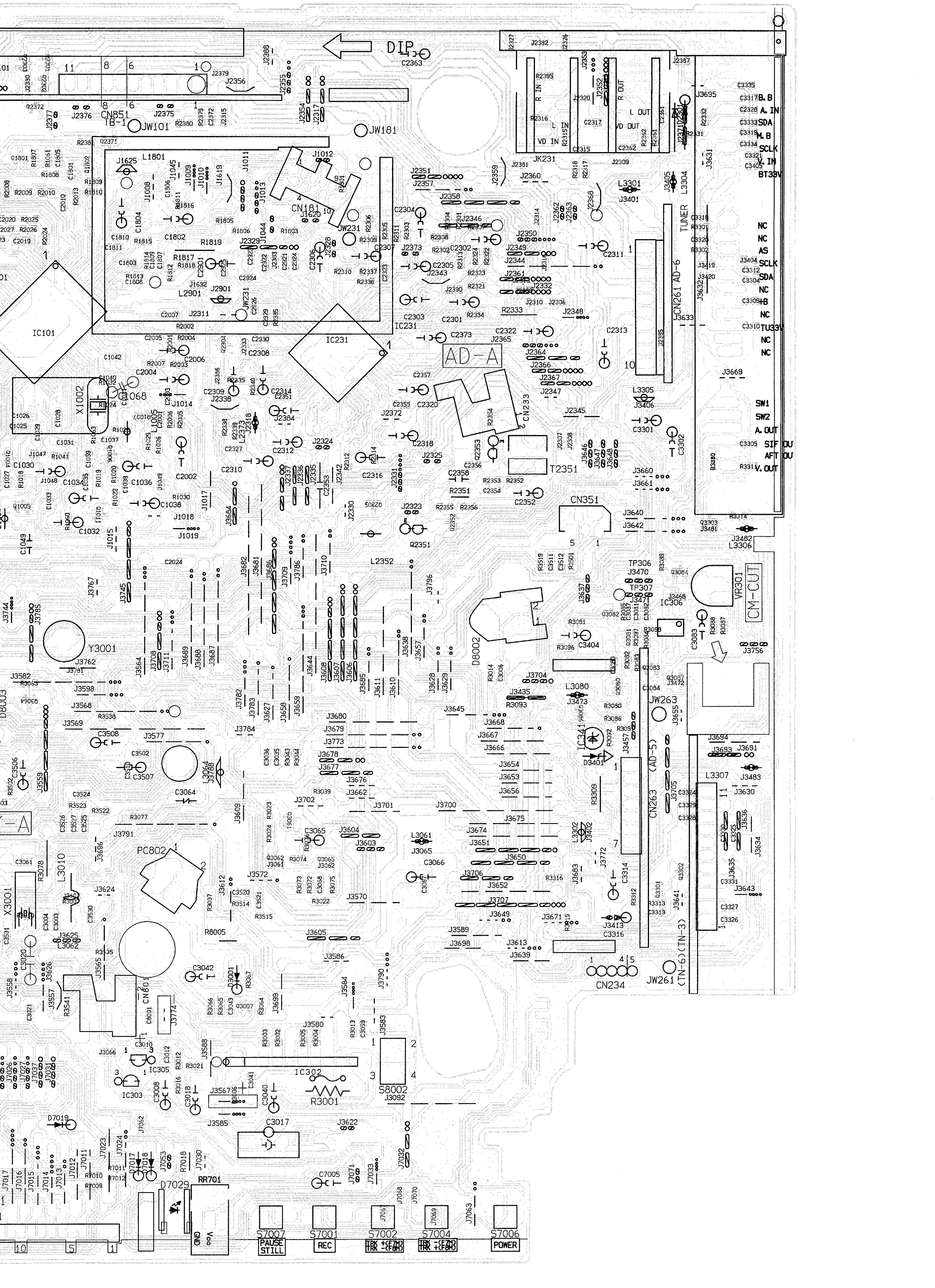



F5001 T2.5A H 250V
WARNING:DANGEROUS VOLTAGE
COMPL, PW-A
TC-A
EJECT
CMK-P2X
PWB, CP-1
1AC4B10C4700AG
S7010
STP/EJC REC
S7003
FF EJECT
S7008
PLAY
S7005
REW
IC301
IC304
PC801
T5001
CN701
CN501
CN352
CN201
TB-1
CN861

CP-1 P.W.B.



9 10 11 12 13 14 15 16 17 18 19

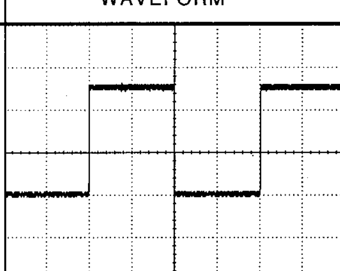
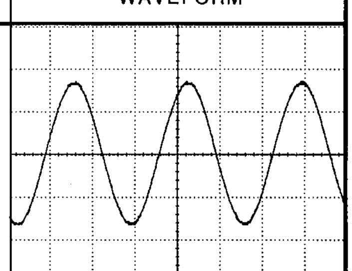
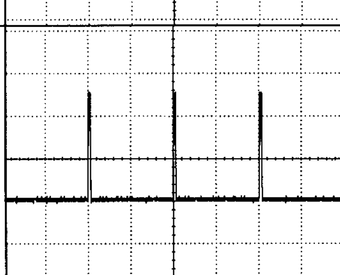
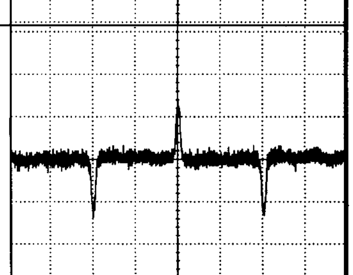
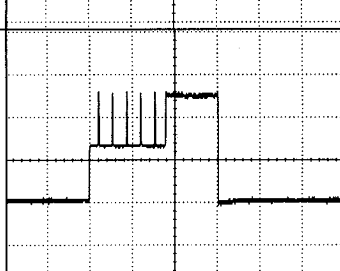
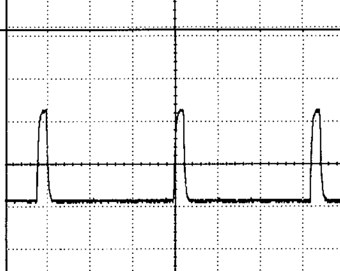
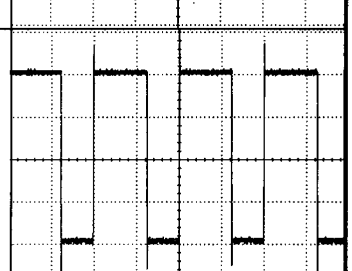
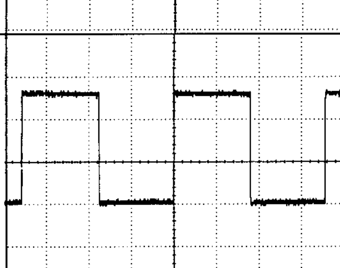

DIP
AD-A
IC101
IC231
X1002
Y3001
PC802
IC302
IC303
IC305
R3001
S8002
TUNER
CN261 AD-6
CN263 (AD-5)
CN351
CN234
(TN-6)(TN-3)
JK231
CN233
T2351
D8002
VR301
CM-CUT
IC306
JW263
JW261
B.B
A.IN
SDA
M.B
SCLK
V.IN
BT33V
NC
AS
SCLK
SDA
+B
TU33V
SW1
SW2
A.OUT
SIF OUT
AFT OUT
V.OUT
R IN
L IN
VD IN
R OUT
L OUT
VD OUT
RR701
D7029
GND
Vcc
S7007
PAUSE STILL
S7001
REC
S7002
S7004
S7006
POWER
13
14
15
16
17
18
19
20
21
22
23

IC301 SYSTEM CONTROL,TIMER,TUNING CONTROL,OSC & SERVO MPU PIN FUNCTIONS

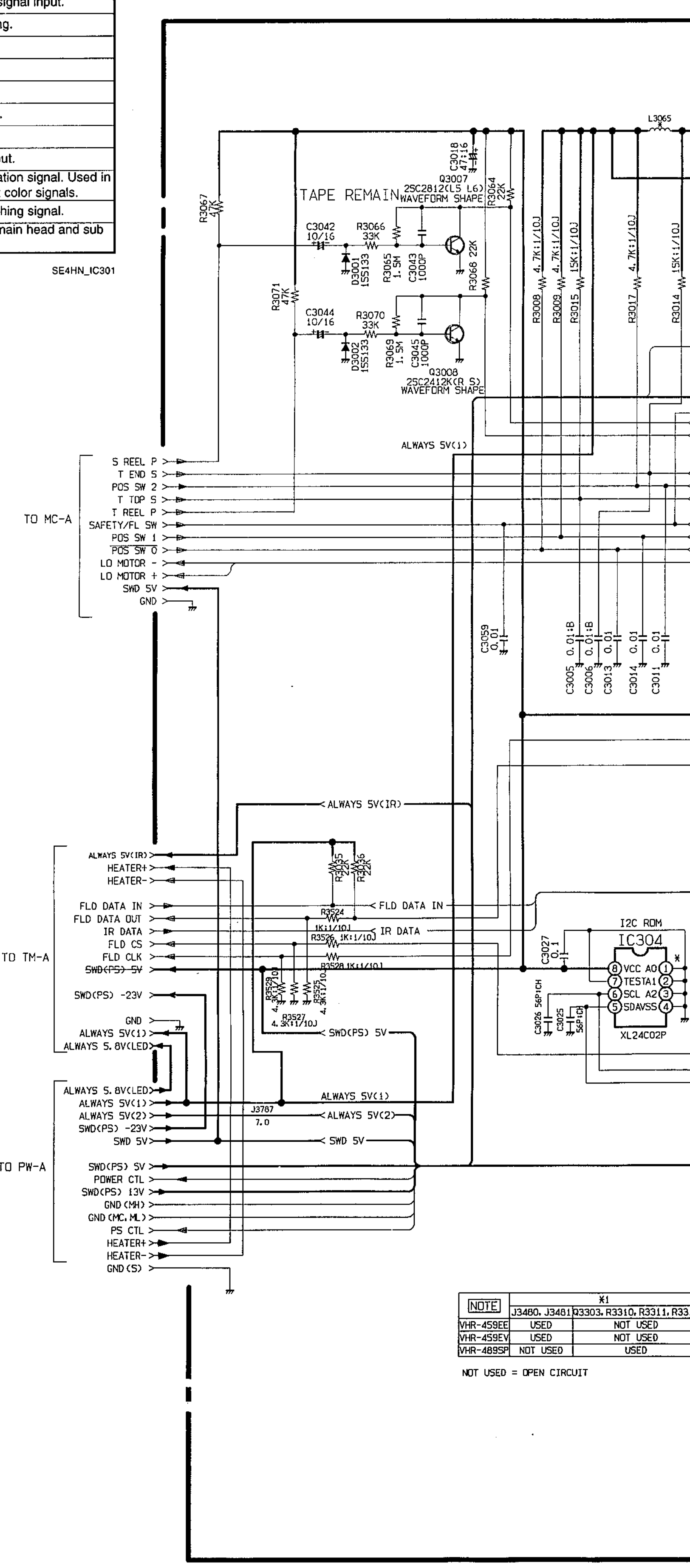
No.	Name	I/O	H/L	Signal Function
1	GND	-	-	Ground terminal
2	OPEN	-	-	-
3	T REEL P	I	-	Pulse signal from take up reel moving sensor.
4	S REEL P	I	-	Pulse signal from supply up reel moving sensor.
5	REMOCON IN	I	-	Remote control signal input.
6	ML-D	O	-	Loading motor rotation indication signal. (Load "H", Brake "M", Unload "L")
7	ML-S	O	-	Loading motor rotation speed indication signal. (High "H", Middle "M", Low "L")
8	FLSTART + SAFETY	I	L	Switch input indicating start of cassette loading or discharge by cassette mechanism and detecting accidental erasure prevention tab of cassette tape.
9	SW0	I	-	Data indicating operation position of mechanism.
10	POWER UP	O	H	High output except when power is off.
11	SW1	I	-	Data indicating operation position of mechanism.
12	SW2	I	-	Data indicating operation position of mechanism.
13	REMOCON OUT	-	-	-
14	FLD SCLK	O	-	Clock pulse for FLD display drive IC,
15	FLD SDIN	I	-	Data signal input from FLD display drive IC,
16	FLD SDOT	O	-	Data signal output to FLD display drive IC,
17	I2C DAT	O	-	Control signal output to tuner, video-audio and HiFi audio IC.
18	I2C CLK	O	-	Clock signal output to tuner, video-audio and HiFi audio IC.
19	N.C.	-	-	-
20	MC F/R	O	-	Capstan motor rotation (normal/reverse) indication signal. (reverse H)
21	CM SKIP P	O	-	-
22	TU AD MUTE	O	H	Signal disable tuner audio signal output.
23	RF SW P	O	-	RF switching pulse created by head drum PG.
24	QVD	O	-	Quasi vertical synchronizing signal.
25	RESET	I	L	Initial reset terminal for this IC.
26	CM SKIP IN	I	-	-
27	FLD CS	O	H	Chip select signal to FLD display drive IC.
28	TU C-SYNC	I	-	Composite synchronizing signal input.
29	CLK ADJ	-	-	-
30	AF SW P	O	-	AF switching pulse created by head drum PG.
31	N.C.	-	-	-
32	N.C.	-	-	-
33	MC-PWM	O	-	Output of capstan motor servo control signal. (PWM signal)
34	MH-PWM	O	-	Output of head drum motor servo control signal. (PWM signal)
35	Q SOUND H	O	H	Signal to indicate "Q sound" is on.
36	VDD	-	-	Back up 5V
37	OSCO	O	-	IC clock OSC terminal.
38	OSCI	I	-	14.318MHz
39	VSS	-	-	Ground terminal
40	XI	I	-	IC timer clock OSC terminal.
41	XO	O		32.768KHz
42	VDD	-	-	-
43	V STEREO H	O	H	Quasi stereo sound mode indicating signal.
44	PB-L	O	L	Signal for indicating playback mode.
45	Q SOUND SUPER	O	H	Signal for indicating "Q sound" effect is strong.
46	N.C.	-	-	-
47	VD OUT	O	-	Video output signal from on screen display circuit.
48	VSS2	-	-	Ground terminal.
49	VD IN	I		Video input signal to on screen display circuit.
50	VD IN FILTER	I		Video input signal to on screen display circuit and servo circuit.
51	VDD2	-	-	Always 5V
52	AFCC	-	-	-
53	AFCLPF	-	-	-
54	X3I	I	-	Fsc (for on screen dispay circuit) OSC terminal.
55	X3O	O	-	
56	TN CLK	O	-	Clock signal to control MTS and NICAM decoder.
57	TN DATA	O	-	Data signal to control MTS and NICAM decoder.
58	VSC DATA	O	-	Data to VSC(DMSS) control.
59	VSC CLK	O	-	Clock to VSC(DMSS) control.
60	REC H	O	H	Signal to indicate recording mode.
61	VD MUTE	O	H	Signal disable video signal output.
62	YCA MUTE	O	L	Signal disable video or audio signal output.
63	ALT OFF H.	O	H	Signal to switch the time-constant of APC circuit while special play mode.
64	GND	-	-	Ground
65	DFG SIG IN	I	-	Head drum FG pulse input.
66	PG SIG IN	I	-	Head drum PG(phase) pulse input.
67	FG OUT	O	-	Head drum FG amp output.
68	CFG SIG IN	O	-	Capstan FG pulse input.
69	AMP BIAS	O	-	Bias voltage for DFG amp.
70	VRI	O	-	-
71	AVSS	-	-	Ground terminal.
72	CTLA	-	-	-
73	AVDD	O	-	Always 5V.
74	CTL+	I/O	-	Control pulse I/O.
75	CTL-	I/O	-	Control pulse I/O.
76	CO	-	-	-
77	ROM OP	-	-	-
78	AD MUTE	O	H	Signal disable audio signal output.
79	N.C.	-	-	-
80	POWER DOWN	I	L	Power failure detection circuit.
81	N.C.	-	-	-
82	N.C.	-	-	-
83	AFT C	I	-	Tuner AFT S-curve signal for tuner AFT control.
84	AF ENV	I	-	HiFi audio head envelope detection signal input.
85	VD ENV	I	-	Video head envelope detection signal input for ATR function.
86	TU SW2	O	-	Detect the system of RF out. (PALI H)
87	TU SW1	O	-	Detect the system of RF out. (PALDK H)
88	T TOP S	I	L	Sensor signal input for tape beginning detection.
89	T END S	I	L	Sensor signal input for tape end detection.
90	SHORT TEST	I	L	Audio record mode indicating signal input.
91	NORM A CTL	O	-	H during normal audio recording.
92	N.C.	-	-	-
93	N.C.	-	-	-
94	N.C.	-	-	-
95	FSS IN	I	-	CH+ mode control signal input.
96	AVCTL (SY)	O	H	AV control signal output.
97	PS CTL	O	-	Power save control signal output.
98	ROTARY	O	-	Video head CH1/CH2 confirmation signal. Used in the processing of image circuit color signals.
99	H AMP SW	O	-	Main head and sub head switching signal.
100	ENV SW	I	-	Input comparatione signal for main head and sub head.

SE4HN_IC301

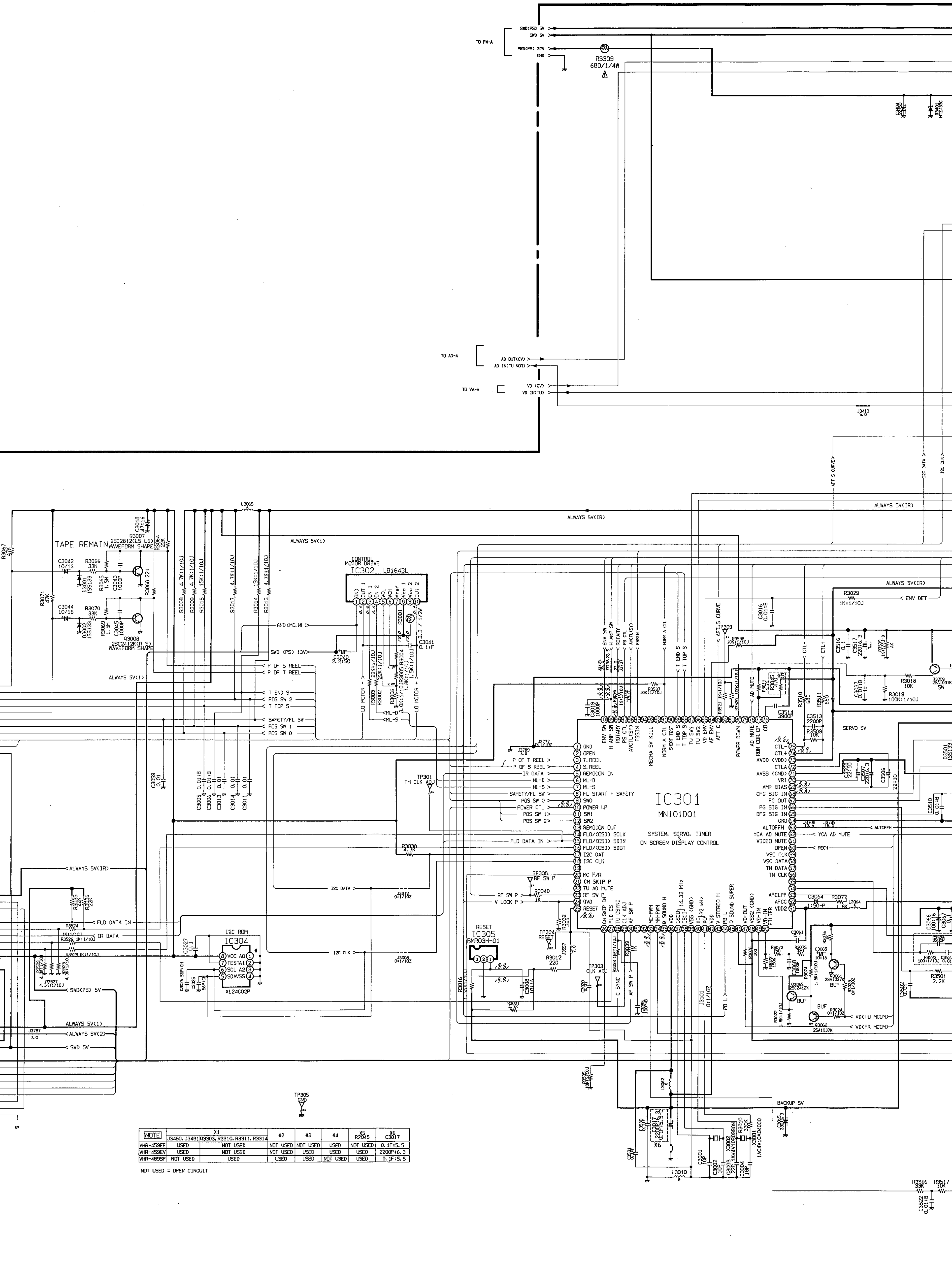
SERVO CIRCUIT WAVEFORMS

TEST LOCATION	WAVEFORM	TEST LOCATION	WAVEFORM
IC301 PIN 23 REC/PB RF SWP 2V/div. 10ms/div.		IC301 PIN 65 REC/PB DFG 500mV/div. 500μs/div.	
IC301 PIN 24 STILL 2V/div. 10ms/div.		IC301 PIN 66 REC/PB DPG 100mV/div. 10ms/div.	
IC301 PIN 24 STILL V LOCK 2V/div. 200μs/div.		IC301 PIN 67 REC/PB CFG OUT 200mV/div. 500μs/div.	
IC301 PIN 28 REC/PB C-SYNC 2V/div. 20μs/div.		IC301 PIN 74 REC CTL+ 1V/div. 20ms/div.	
IC301 PIN 33,34 REC/PB 2V/div. 5μs/div.			

WF-S-AF4H-Z



CP-1 BOARD (SY-A) SYSTEM CONTROL, TIMER, TUNER, OSC & SERVO

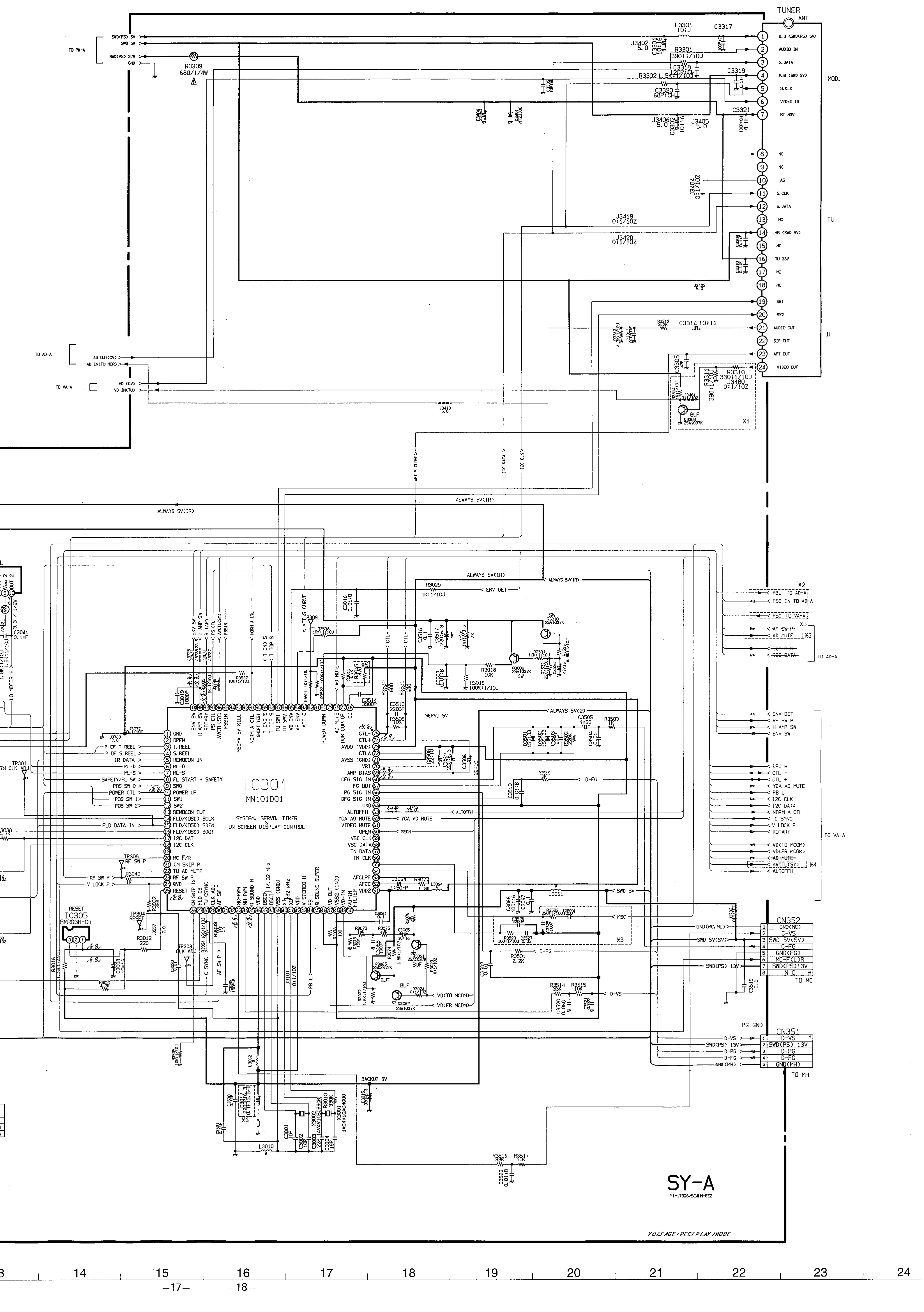


NOTE	※1		※2	※3	※4	※5	※6
	J3480, J3481	Q3303, R3310, R3311, R3314				R2045	C3017
VHR-459EE	USED	NOT USED	NOT USED	NOT USED	USED	NOT USED	0.1F;5.5
VHR-459EV	USED	NOT USED	NOT USED	USED	USED	USED	2200P;6.3
VHR-489SP	NOT USED	USED	USED	USED	NOT USED	USED	0.1F;5.5

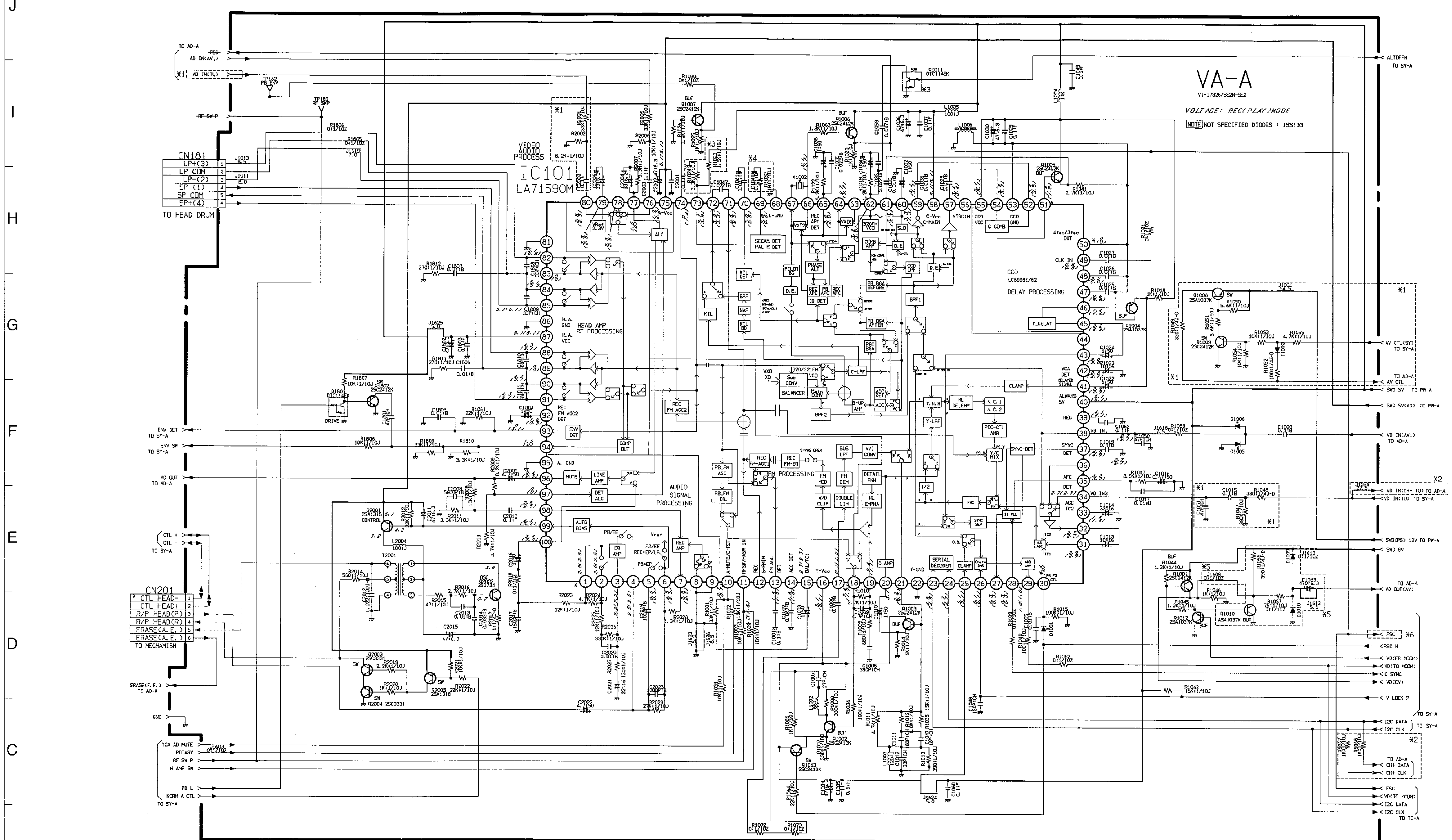
NOT USED = OPEN CIRCUIT

9 10 11 12 13 14 15 16 17 18 19

SY-A) SYSTEM CONTROL, TIMER, TUNER, OSC & SERVO

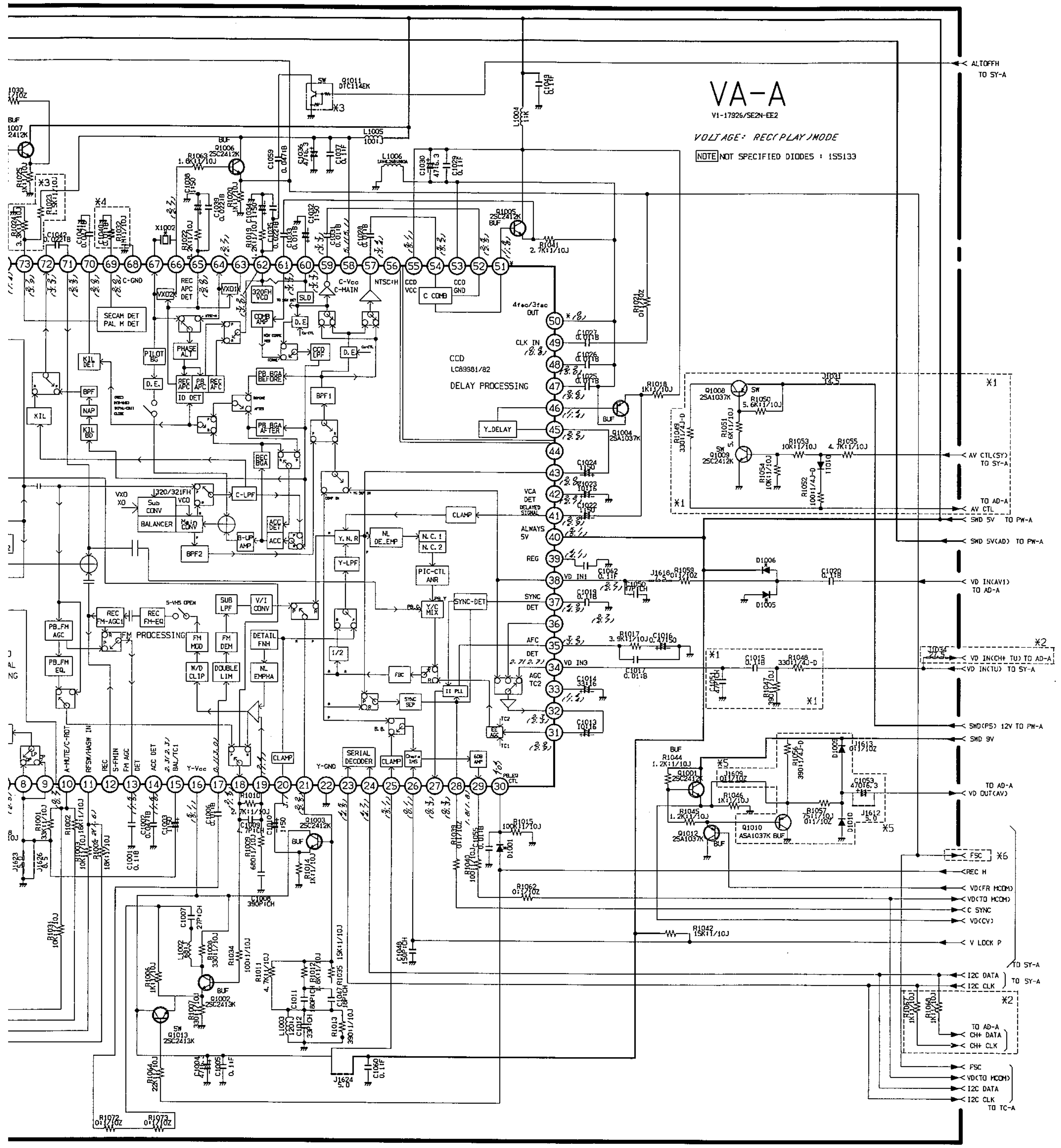


CP-1 BOARD (VA-A) VIDEO & AUDIO



NOTICE	※1	※2	※3	※4		※5			※6
				C1040	R1032	J1609, J1612	R1057	Q1010, R1056, D1009, D1010, C1053	
VHR-459EE	USED	NOT USED	USED	USED	NOT USED	NOT USED	75OHM	USED	NOT USED
VHR-459EV	USED	NOT USED	NOT USED	NOT USED	USED	NOT USED	75OHM	USED	USED
VHR-489SP	NOT USED	USED	NOT USED	NOT USED	USED	USED	0OHM	NOT USED	USED

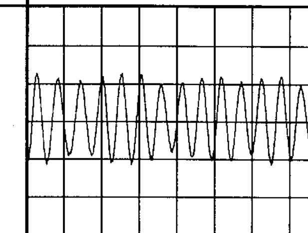
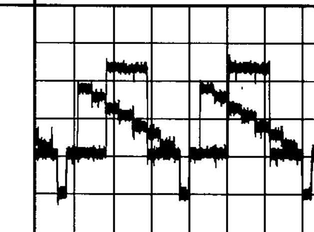
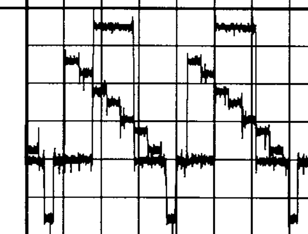
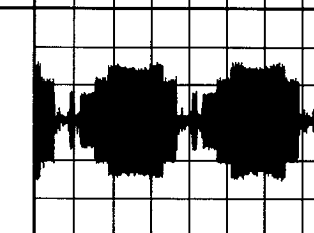
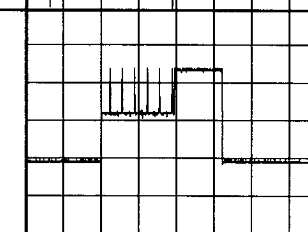
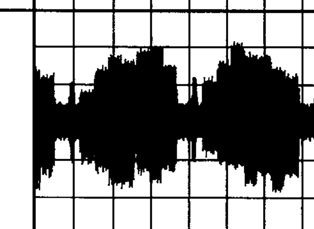
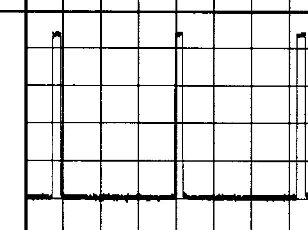
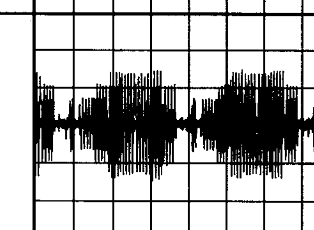
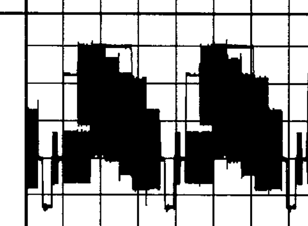
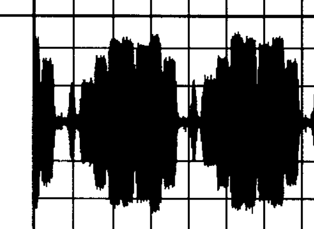
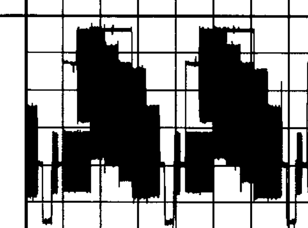
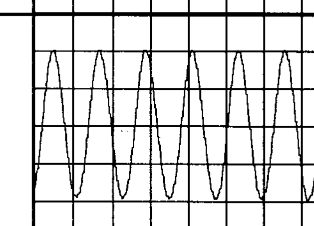
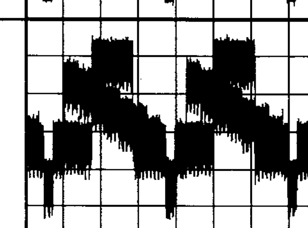
NOT USED = OPEN CIRCUIT



NOTICE	※1	※2	※3	※4		※5			※6
				C1040	R1032	J1609, J1612	R1057	Q1010, R1056, D1009, D1010, C1053	
VHR-459EE	USED	NOT USED	USED	USED	NOT USED	NOT USED	75OHM	USED	NOT USED
VHR-459EV	USED	NOT USED	NOT USED	NOT USED	USED	NOT USED	75OHM	USED	USED
VHR-489SP	NOT USED	USED	NOT USED	NOT USED	USED	USED	0OHM	NOT USED	USED

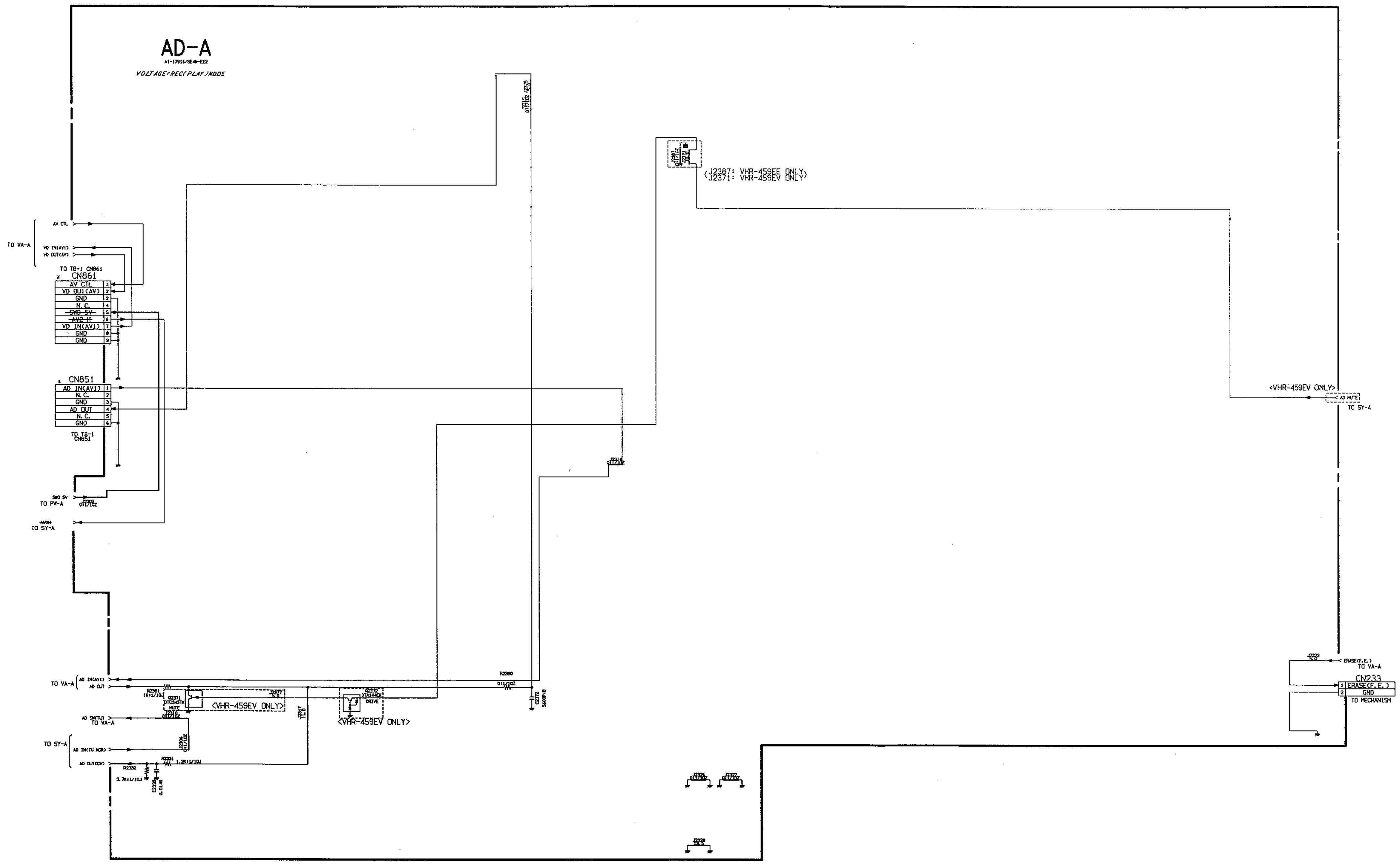
NOT USED = OPEN CIRCUIT

VIDEO CIRCUIT WAVEFORMS

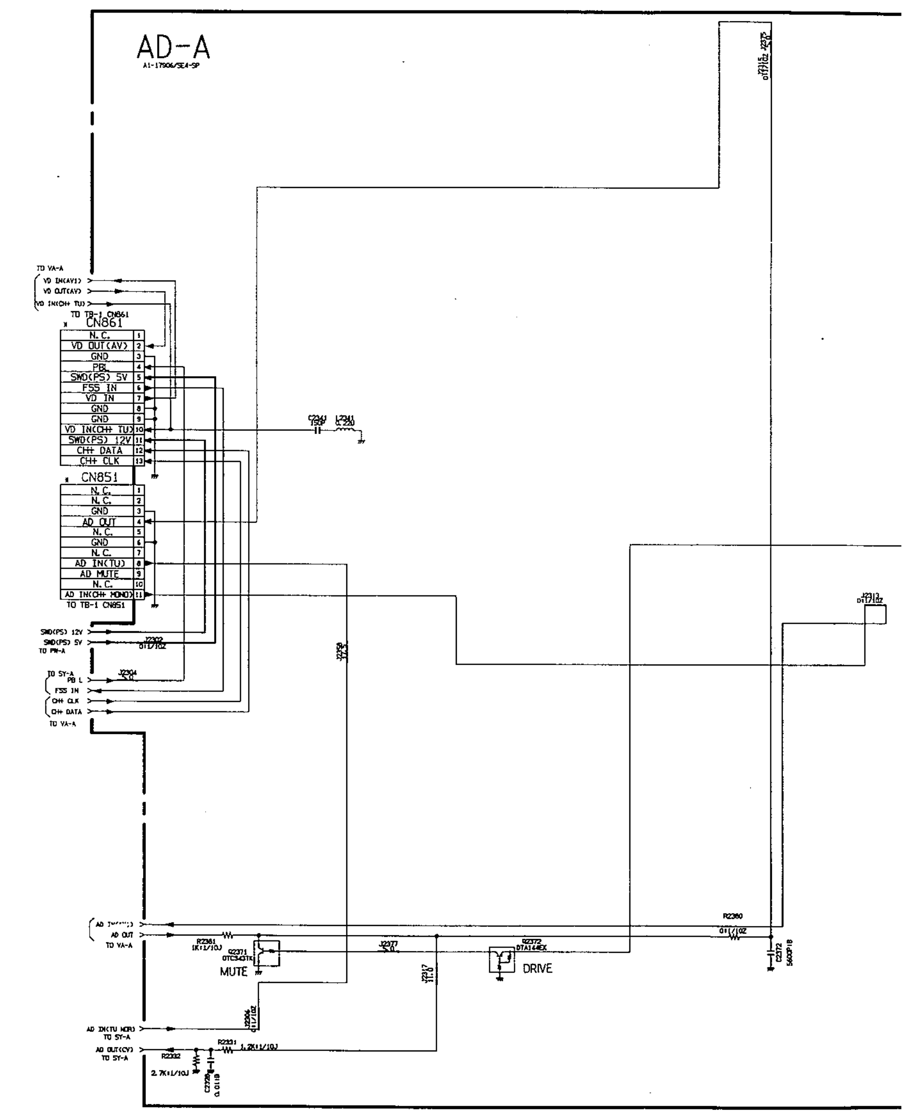
TEST LOCATION	WAVE FORM	TEST LOCATION	WAVE FORM
IC101 PIN17 PLAY 100mV/500ns/div		IC101 PIN43,45 REC/PLAY 100mV/20µs/div	
IC101 PIN20,21 REC/PLAY 100mV/20µs/div		IC101 PIN57,59 REC/PLAY 100mV/20µs/div	
IC101 PIN26 STILL 2V/200µs/div		IC101 PIN51,61 REC/PLAY 100mV/20µs/div	
IC101 PIN28 REC/PLAY 1V/20µs/div		IC101 PIN71,72 REC 100mV/20µs/div	
IC101 PIN29 REC/PLAY 500mV/20µs/div		IC101 PIN71,72 PLAY 100mV/20µs/div	
IC101 PIN34,36,38 REC 200mV/20µs/div		IC101 PIN90 REC 1V/200ns/div	
IC101 PIN41,46 REC/PLAY 100mV/20µs/div			

WF_V_SE4

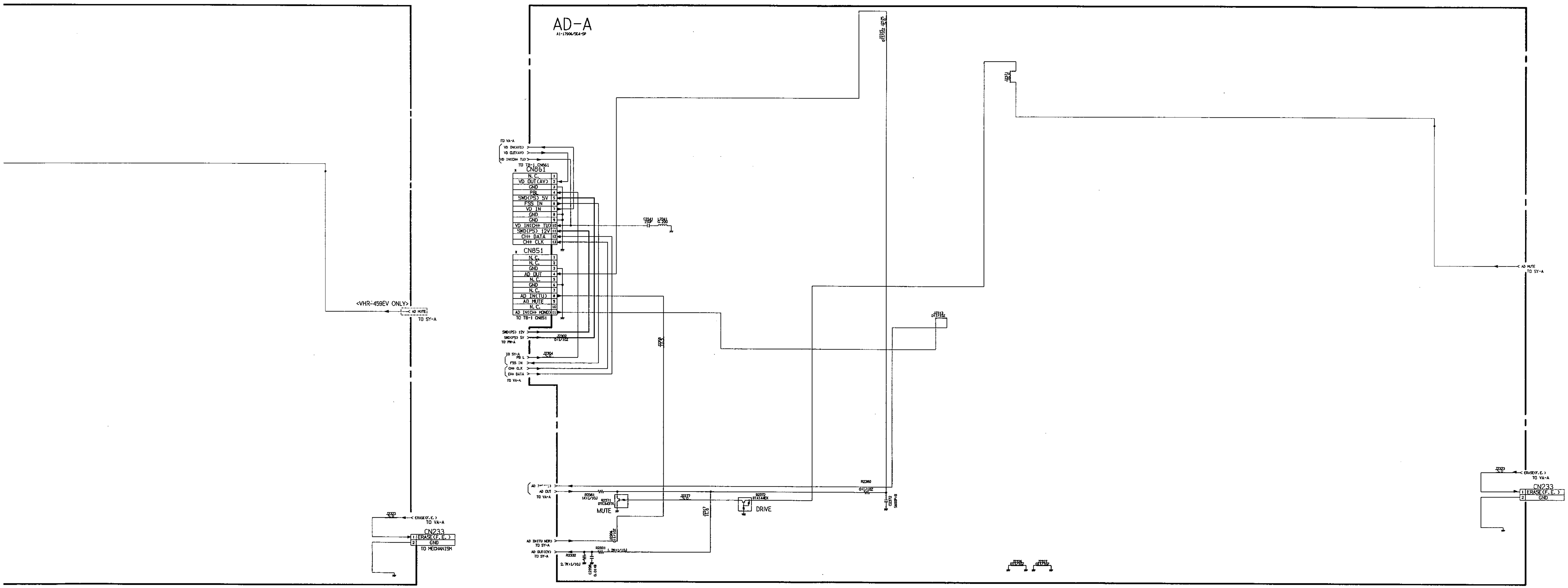
CP-1 BOARD (AD-A) AUDIO (EXCEPT VHR-489SP)



CP-1 BOARD (AD

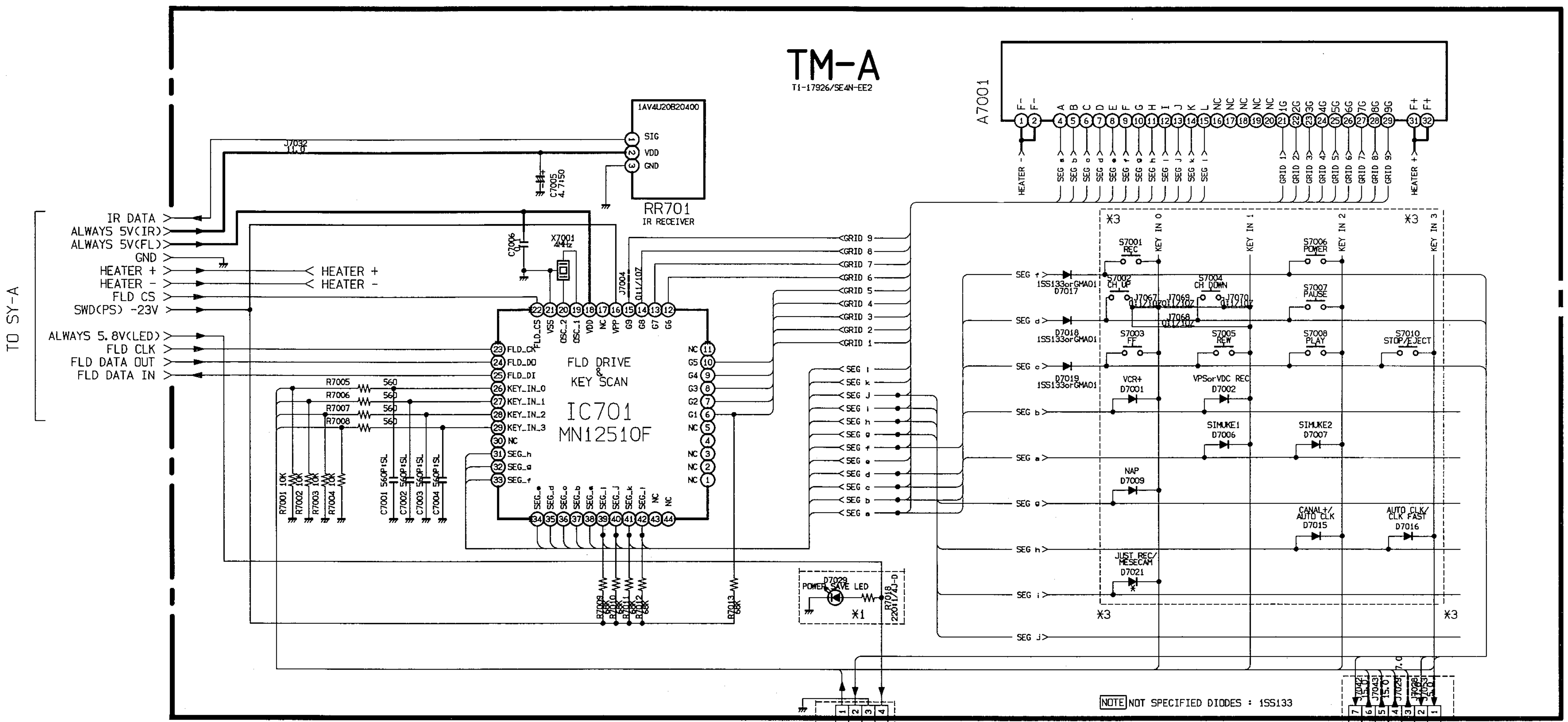


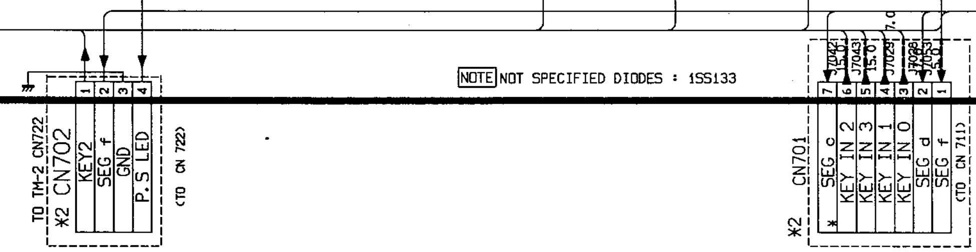
CP-1 BOARD (AD-A) AUDIO (VHR-489SP ONLY)



8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

CP-1 BOARD (TM-A) DISPLAY (FLD) & KEY SCAN





NOTICE	*1	*2	*3					
			S7001, S7003, S7005, S7006, S7007, S7008 S7010, J7067, J7070, D7006, D7009	S7002, S7004 D7001, D7002	J7068, J7069 D7021	D7007	D7015	D7016
VHR-459EE	USED	NOT USED	USED	USED	NOT USED	NOT USED	USED	NOT USED
VHR-459EV	NOT USED	USED	NOT USED	USED	USED	USED	NOT USED	NOT USED
VHR-489SP	NOT USED	USED	NOT USED	USED	USED	NOT USED	USED	USED

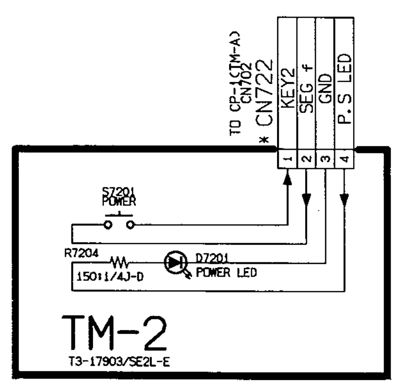
NOT USED = OPEN CIRCUIT

A7001 DISPLAY (FLD) GRID/ANODE DRAWING & TABLE

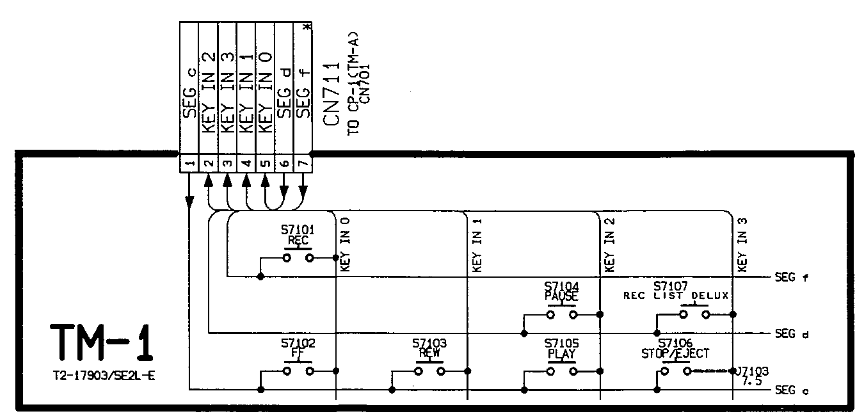
ANODE CONNECTION

GRID / SEGMENT	9G	8G	7G	6G	5G	4G	3G	2(
a	ST	PR	L	◁	▷	REC	▮▮	AU
b	n	—	n	n	—	—	n	–
c	a	a	a	a	a	a	a	a
d	b	b	b	b	b	b	b	b
e	c	c	c	c	c	c	c	c
f	d	d	d	d	d	d	d	d
g	e	e	e	e	e	e	e	e
h	f	f	f	f	f	f	f	f
i	g	g	g	g	g	g	g	g
j	m	m	m	m	m	m	m	m
k	BIL	—	VPS	—	col 2	—	—	col
l	VCR	[illegible]	R	M	PDC	[illegible]	DATE	LI

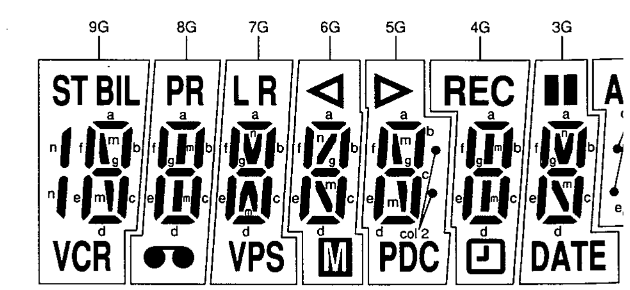
TM-2 BOARD SWITCH (EXCEPT VHR-459EE)



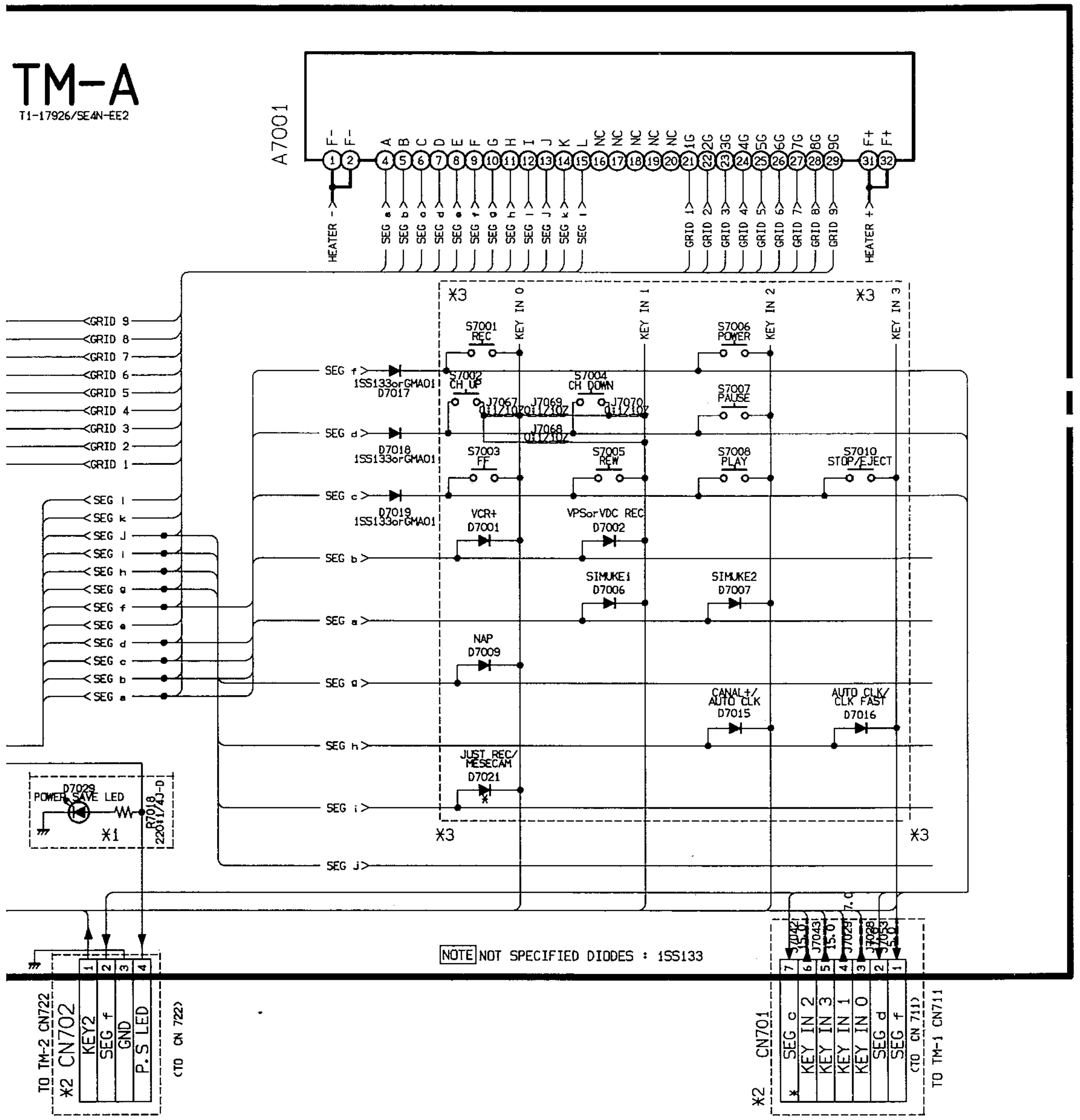
TM-1 BOARD SWITCH (EXCEPT VHR-459EE)



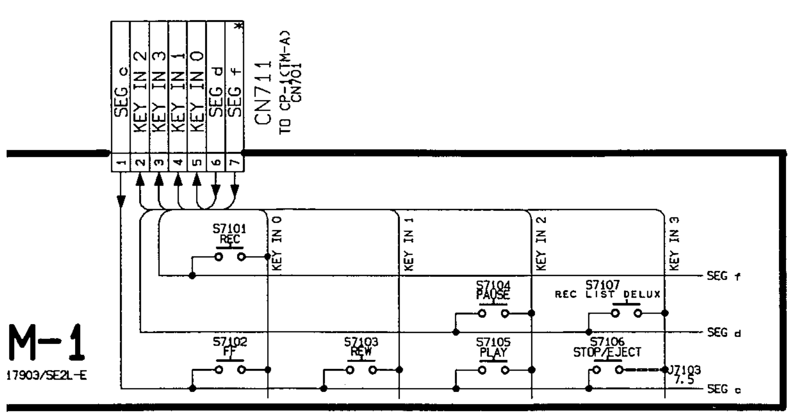
GRID & SEGMENT ASSIGNMENT



DISPLAY (FLD) & KEY SCAN



TM-1 BOARD SWITCH (EXCEPT VHR-459EE)



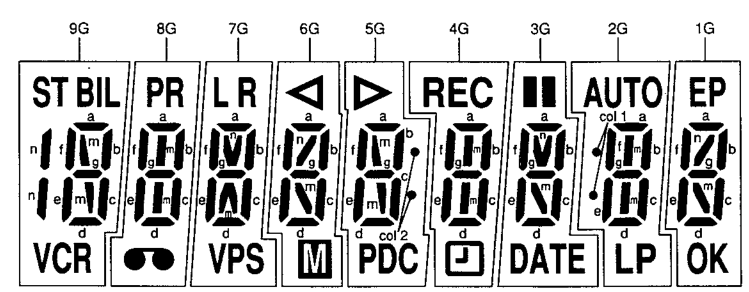
A7001 DISPLAY (FLD) GRID/ANODE ASSIGNMENT DRAWING & TABLE

ANODE CONNECTION

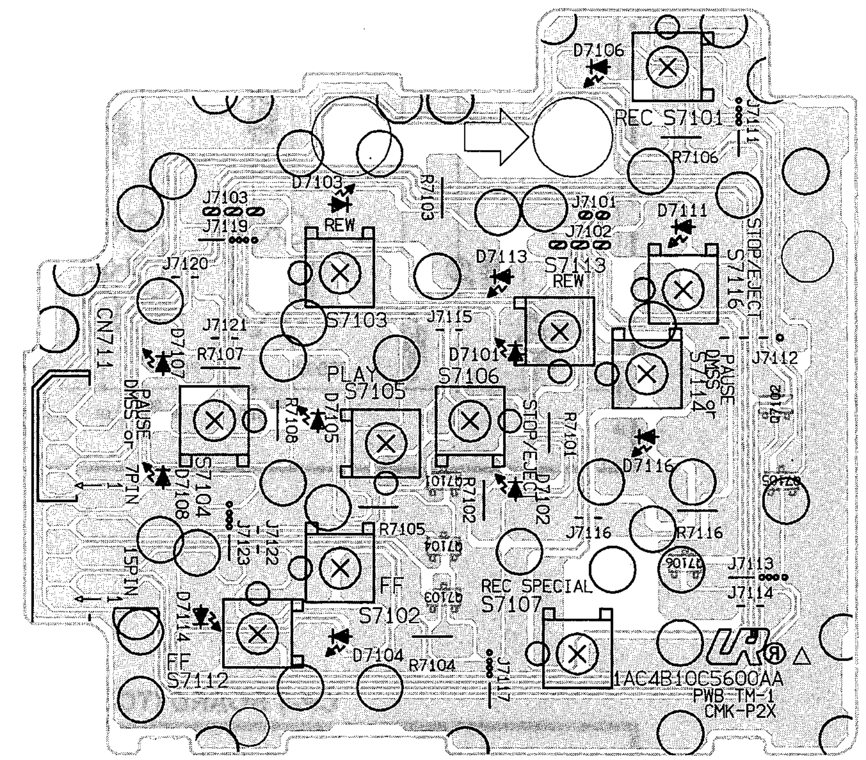
SEGMENT \ GRID	9G	8G	7G	6G	5G	4G	3G	2G	1G
a	ST	PR	L	◁	▷	REC	❚❚	AUTO	EP
b	n	—	n	n	—	—	n	—	n
c	a	a	a	a	a	a	a	a	a
d	b	b	b	b	b	b	b	b	b
e	c	c	c	c	c	c	c	c	c
f	d	d	d	d	d	d	d	d	d
g	e	e	e	e	e	e	e	e	e
h	f	f	f	f	f	f	f	f	f
i	g	g	g	g	g	g	g	g	g
j	m	m	m	m	m	m	m	m	m
k	BIL	—	VPS	—	col 2	—	—	col 1	—
l	VCR	●●	R	M	PDC	◷	DATE	LP	OK

GR-00600A

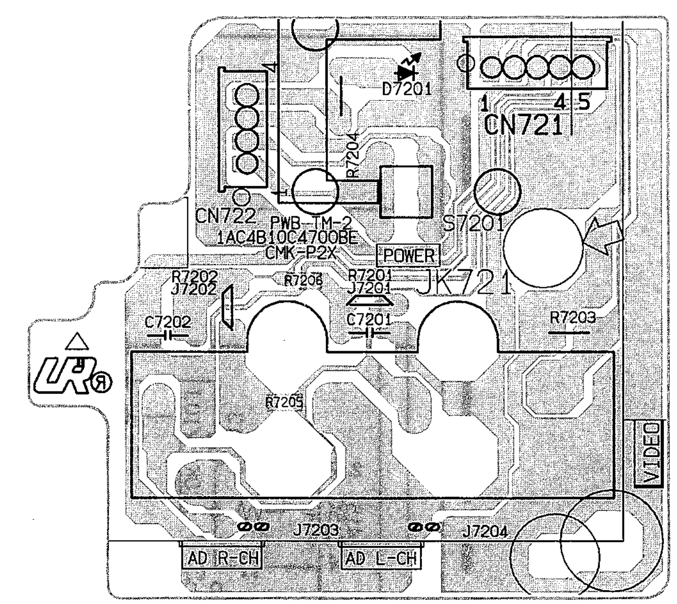
GRID & SEGMENT ASSIGNMENT



TM-1 P.W.B. (EXCEPT VHR-459EE)

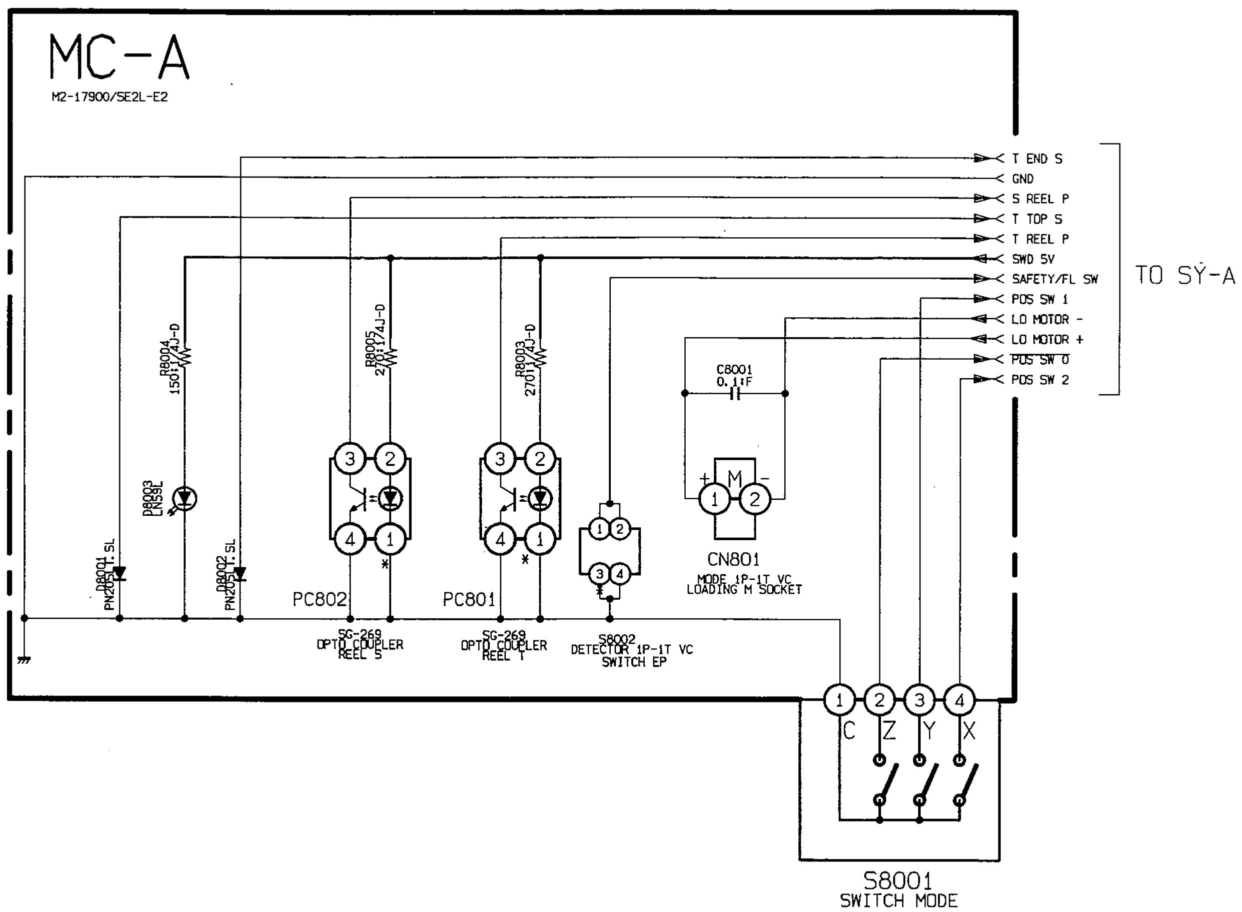


TM-2 P.W.B. (EXCEPT VHR-459EE)

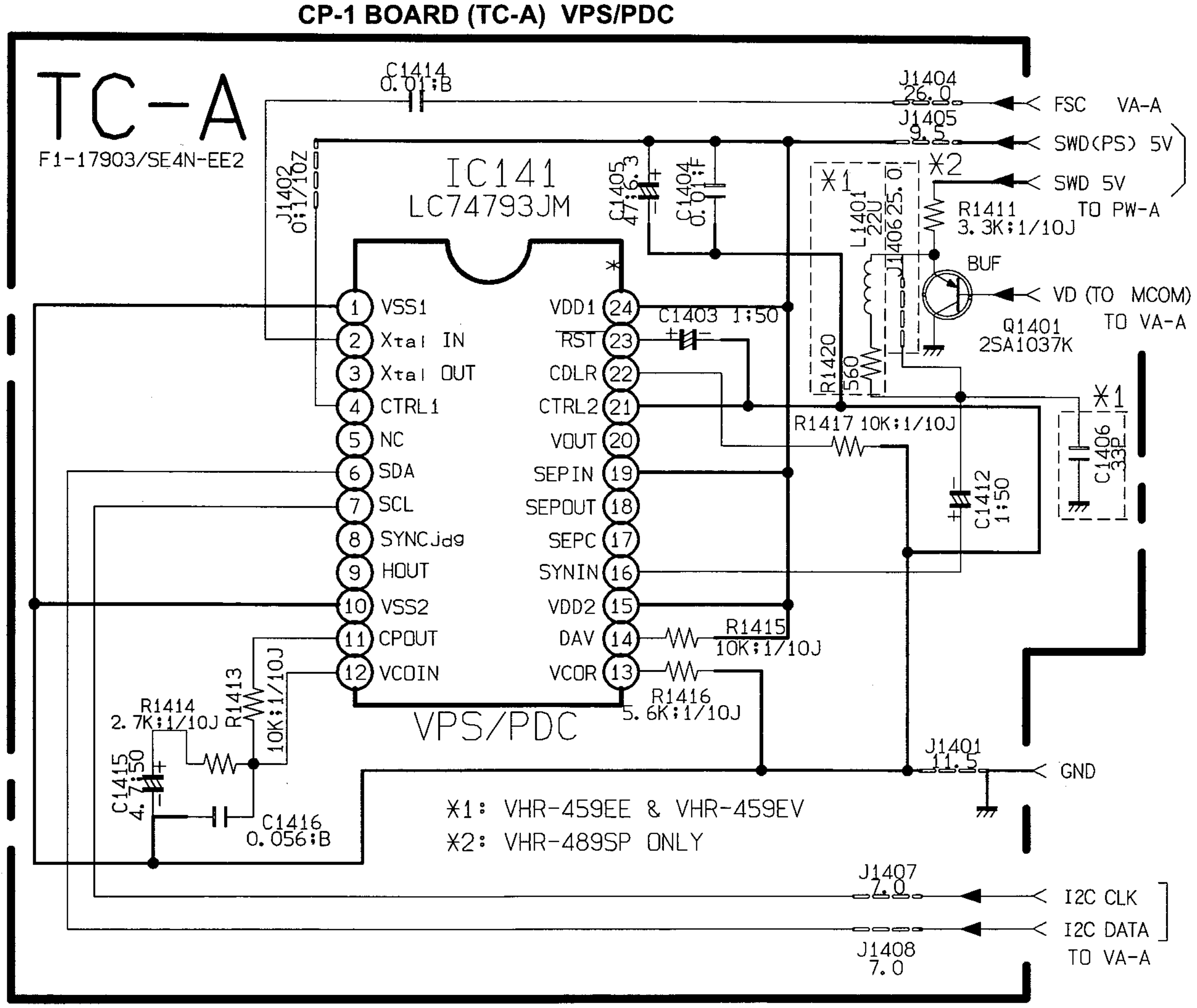


7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

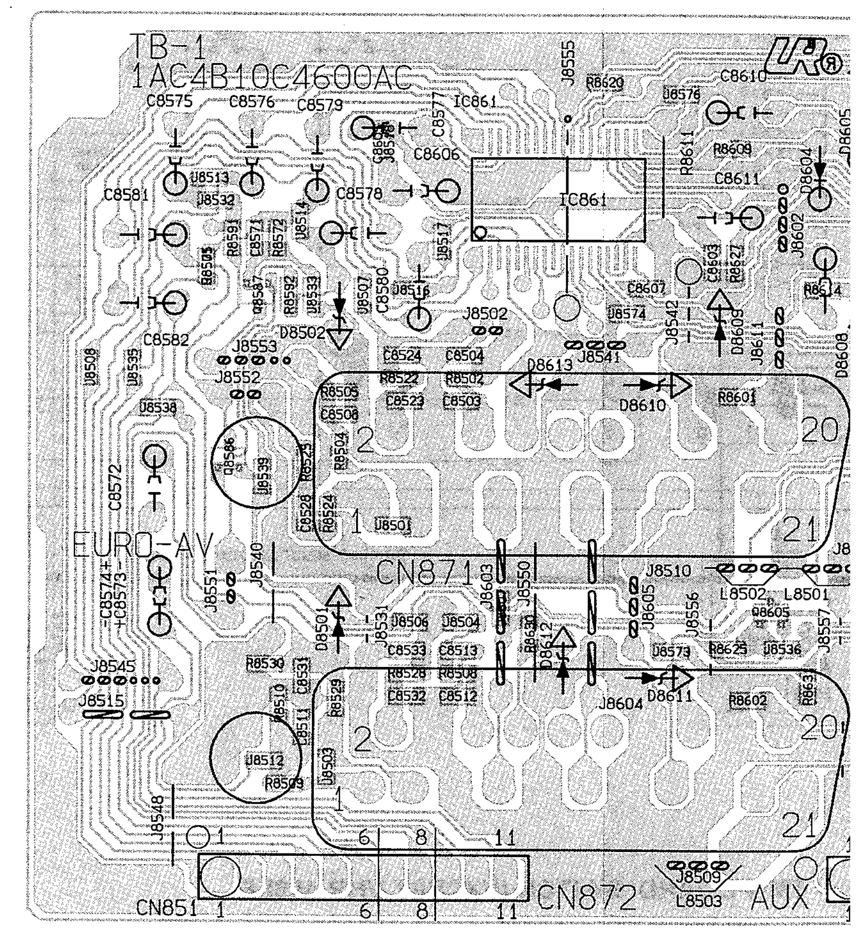
CP-1 BOARD (MC-A) MECHANISM SENSOR

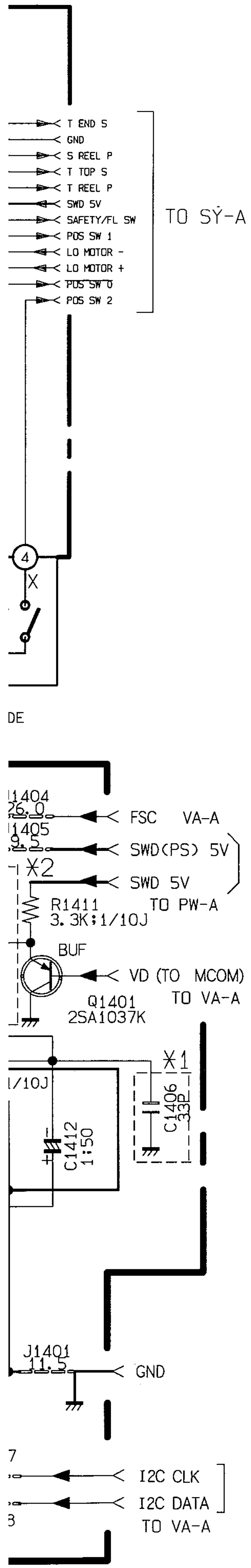


CP-1 BOARD (TC-A) VPS/PDC

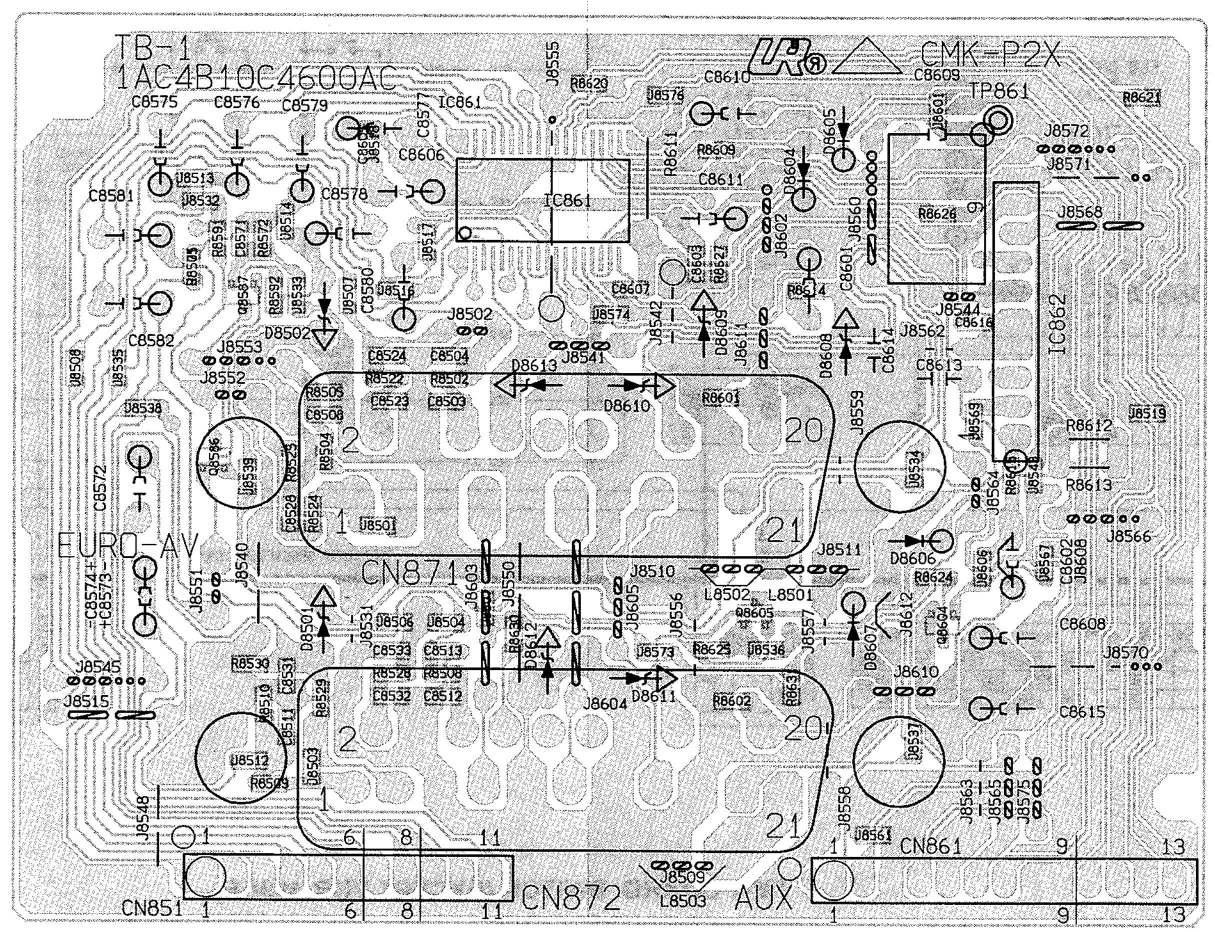


TB-1 P.W.B.

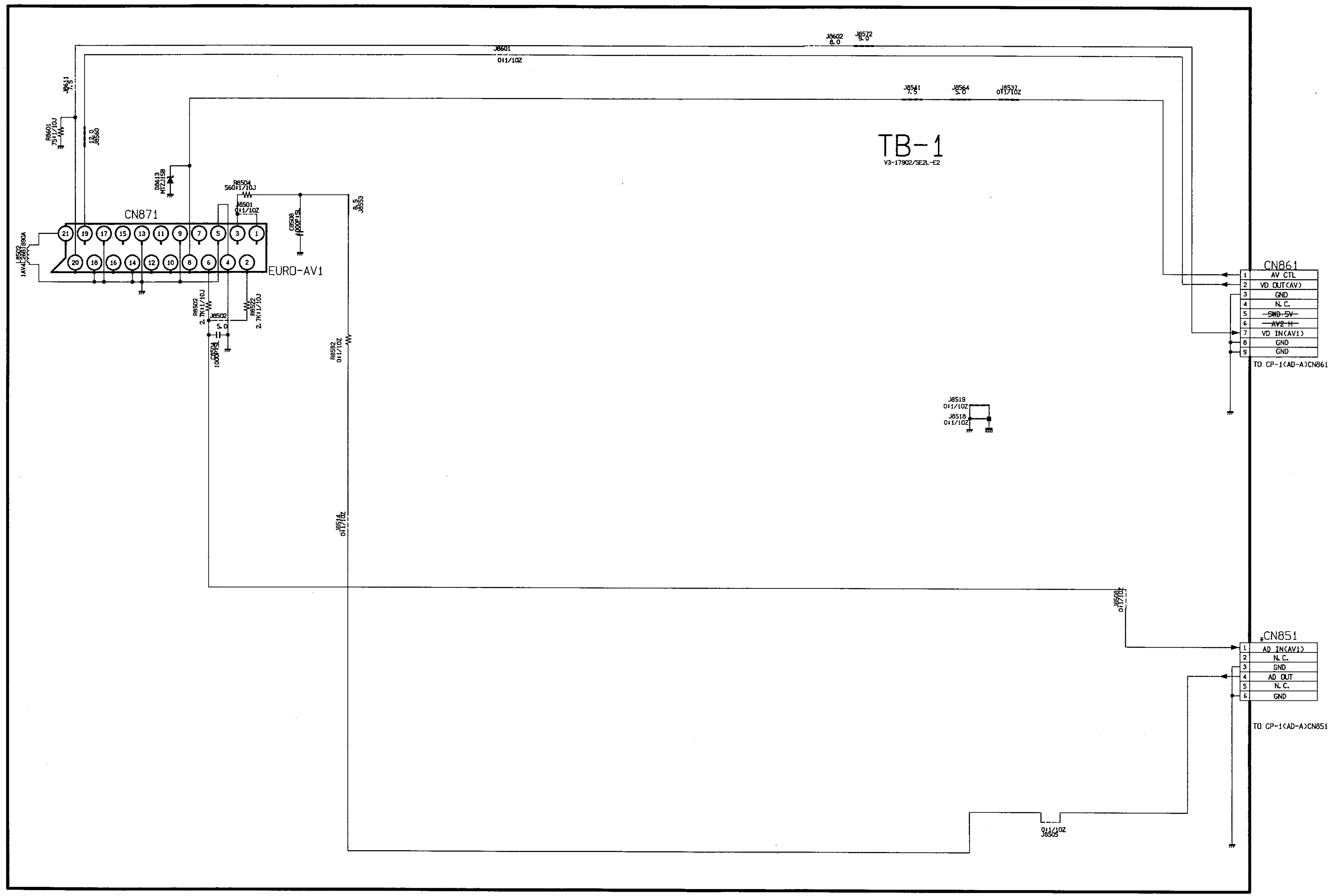



T END S
GND
S REEL P
T TOP S
T REEL P
SWD 5V
SAFETY/FL SW
POS SW 1
LD MOTOR -
LD MOTOR +
POS SW 0
POS SW 2
TO SY-A
FSC VA-A
SWD(PS) 5V
SWD 5V
TO PW-A
R1411
3.3K;1/10J
BUF
VD (TO MCOM)
TO VA-A
Q1401
2SA1037K
C1406
33P
C1412
1:50
J1401
11.5
GND
I2C CLK
I2C DATA
TO VA-A

TB-1 P.W.B.


TB-1
1AC4B10C4600AC
CMK-P2X
TP861
IC861
IC862
EURO-AV
CN871
CN872
AUX
CN851
CN861

TB-1 BOARD TERMINAL (EXCEPT VHR-489SP)



TB-1 BOARD TERMINAL AND DECODER INTERFACE (VHR-489SP ONLY)

